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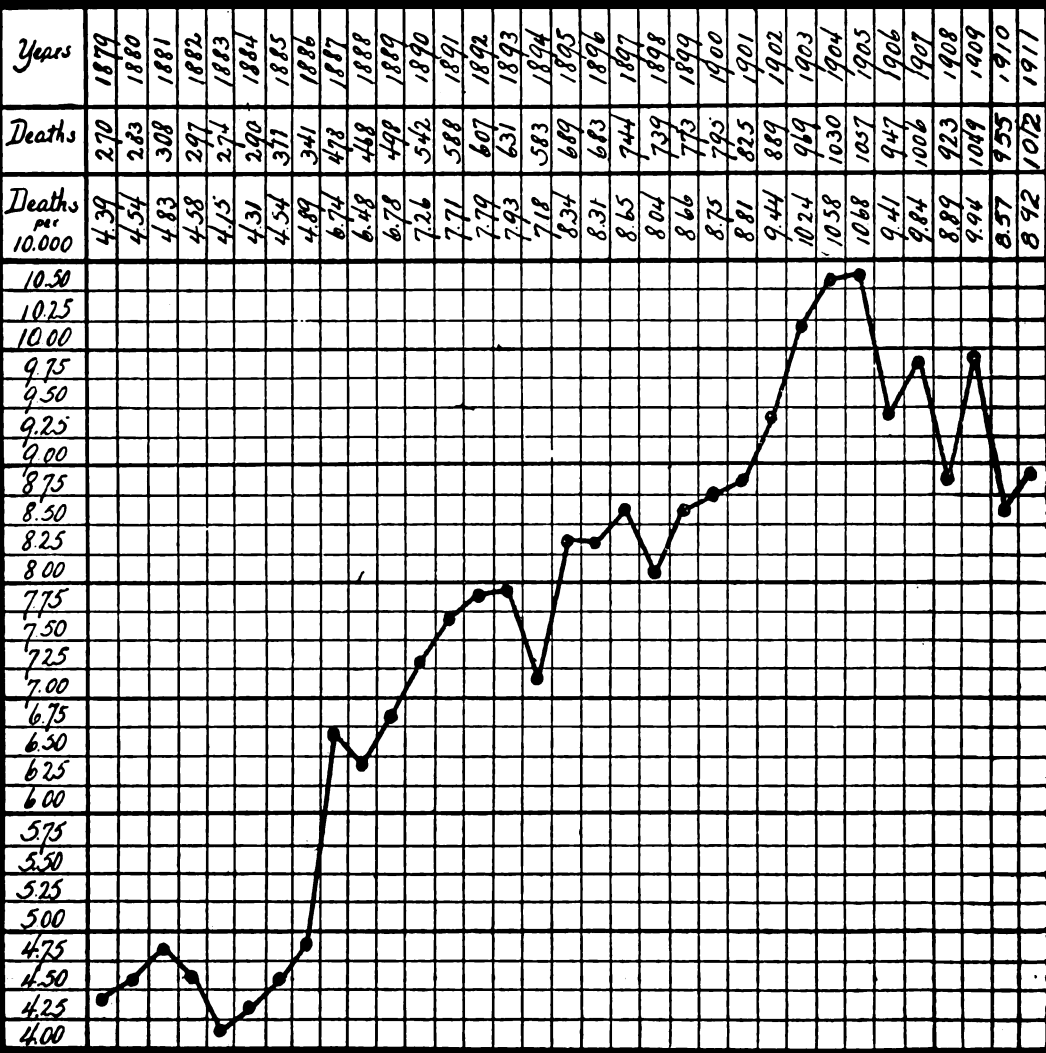

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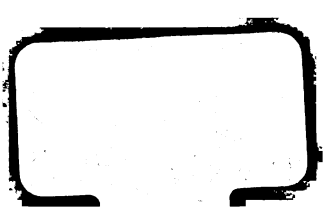

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Edith C. Jordan

State of Connecticut
PUBLIC DOCUMENT No. 25

THIRTY-SECOND REPORT
(THIRD BIENNIAL)

OF THE

State of Board of Health

OF THE

State of Connecticut

For the Two Years ended September 30, 1912

PRINTED BY ORDER OF THE LEGISLATURE

HARTFORD, CONN.
PUBLISHED BY THE STATE.
1913.

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HARVARD UNIVERSITY
JUN 28 1944
GRADUATE SCHOOL
OF PUBLIC ADMINISTRATION

PUBLICATION
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THE BOARD OF CONTROL.

Gift of Edwin O. Jordan

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MEMBERS OF THE BOARD

THEODORE H. MCKENZIE, Civil Engineer, Southington, 1913
ARTHUR J. WOLFF, M. D., Hartford, . . . 1913
ALBERT W. PHILLIPS, M. D., Derby, . . . 1915
LOUIS J. PONS, M. D., Roxbury, ... 1915
EDWARD K. ROOT, M. D., Hartford, President, . . 1917
LEWIS SPERRY, Attorney at Law, South Windsor, . 1917
JOSEPH H. TOWNSEND, M. D., Secretary, New Haven.

Executive Office, State Capitol, Hartford.

State Superintendent of Registration of Vital Statistics.

DR. J. H. TOWNSEND, Secretary of the Board.

LABORATORY OF THE BOARD.

WESLEYAN UNIVERSITY CAMPUS, MIDDLETOWN.

PROF. HERBERT W. CONN, PH. D.

Bacteriologist and Director.

JAMES A. NEWLANDS, B. S.

Chemist.

Sanitary Inspector,

GEORGE C. HAM, PH. B., Civil Engineer, Naugatuck.

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State of Connecticut

OFFICE OF THE STATE BOARD OF HEALTH,

CAPITOL, HARTFORD, Dec. 24, 1912.

To His Excellency, SIMEON E. BALDWIN, *Governor of Connecticut:*

SIR:—In compliance with the laws of the State, I have the honor to present to you the Thirty-second Report of the State Board of Health, for the two years ended September 30, 1912.

Very Respectfully,

JOSEPH H. TOWNSEND, M. D.,
Secretary.

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GENERAL REPORT

To His Excellency, Simeon E. Baldwin, Governor of Connecticut:

SIR:—The State Board of Health herewith presents its thirty-second report and third biennial report relative to its operations for the fiscal period ending September 30, 1912, with some recommendations whereby we believe its usefulness to the state could be increased.

PERSONNEL OF THE BOARD.

There have been no changes in the personnel of the Board since the publication of the last report, Dr. Edward K. Root, of Hartford, and Hon. Lewis Sperry, of South Windsor, whose terms expired in 1911, having been reappointed by you.

The eight regular quarterly meetings required by law and six special meetings have been held. The minutes of these meetings printed elsewhere give in detail the business transacted.

The monthly bulletin has been issued with the same regularity as in former years. This bulletin gives an abstract of the mortality reports of the state, the number and kind of infectious diseases occurring in the various towns, comments on health topics and matters of sanitary interest in the state, and gives a summary of the meteorological conditions prevailing during the month. This is mailed to all health officers and town clerks as well as to others who may wish it. It gains a wider reading through the daily press, to which it is distributed, and which quotes from it liberally.

The State Board of Health, through its employees or a committee of the Board, has responded to many requests for conferences with local health officers and town committees in various parts of the State. They have advised as to conditions suspected to endanger the public health, the abatement of nuisances and the disposal of sewage. They have inspected and given advice regarding the pollution of lakes and streams. Many consultations and much correspondence has been had with local health officers relating to diagnoses and practical ways of pre-

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venting the spread of infectious diseases. Public institutions have been visited, outbreaks of epidemic diseases investigated and their origin discovered. On many of these matters written reports have been made and will appear elsewhere in this report.

In April, 1912, the Sixth Sanitary Conference of the health officials of the State was held in Hartford under the auspices of the State Board of Health. Nearly one hundred of the health officers were present. These conferences are of great value in bringing about a closer personal acquaintance among the health officials, and in giving an opportunity for a mutual exchange of experiences while also promoting the improvement of public hygiene by uniform methods of prophylaxis. In many states these annual conferences are required by law.

The Board has always aimed to carry its information and helpfulness direct to the people by issuing and distributing bulletins, some for the especial help of the local health officers, but most of them for the people. Special bulletins are supplied regarding the common infectious diseases, also on such special subjects as the house fly, care of infants, milk production, etc. One direction in which the Board is anxious to do more effective work is in the fulfilment of this educational duty. The opening of the twentieth century has marked a great awakening by the people in sanitation and the most casual observer of passing events cannot fail to notice the increasing interest in health matters. This Board may justly claim its share in the work by aiming at a broader and more general education in public hygiene and a thorough understanding of its relation to the daily life of the individual and a closer relation between the health agencies of the State. To this end we have asked the Legislature for a larger appropriation for the general expenses of the Board in order that we may extend our educational and publicity work. We propose if this is granted to increase the size and scope of our monthly bulletin, to furnish speakers or the material for lectures on hygiene for which there is a demand, and to prepare exhibits on rural hygiene for the state agricultural fairs and other places.

THE LABORATORY.

The valuable work done by the two divisions of the State Laboratory will be seen by reference to their reports given elsewhere in this volume. The number of samples and specimens examined has so increased during the past two years that we have about reached the limit of our present capacity, therefore, we have asked the Legislature for an additional appropriation of two thousand dollars to meet the expected increase in the work during the next two years. The present growth has been due chiefly to the greater demand for the examination of milk and

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to the large number of throat cultures sent us from the schools in order to detect possible diphtheria carriers among the pupils.

Another thing which has taxed the capacity of the Laboratory is the examinations for glanders which is quite a complicated process. This work was undertaken at the earnest solicitation of some of the veterinary surgeons of the state, and the prevalence of the disease which in its early stages is difficult of diagnosis by ordinary methods seemed to demand that it be done.

LEGISLATION.

Among the laws passed by the Legislature of 1911 in the interest of the public health are the acts concerning the use of the common drinking cup, the use of towels in hotels and public lavatories, the procuring and distribution of antitoxins by the State Board of Health, and the sanitary conditions in tenements, lodging houses and boarding houses. These acts were all favored by this Board and have worked well. The tenement house law should be amended so as to extend its operation to all towns instead of being limited to cities and boroughs.

Among the measures that failed to pass in which the Board had a special interest were those giving the State Board of Health authority over the inland and tidal waters of the State to protect them from pollution, an act to protect shell-fish from contamination, and an act giving the Board authority to inspect oyster grounds and opening houses and to grant certificates of their condition.

ABOLITION OF THE COMMON DRINKING CUP.

The established fact that diseases may be spread from one individual to another by the use of the common drinking cup has resulted in legislation in many states regulating or prohibiting its use in public places. Kansas was the pioneer in this movement, her law having been passed in 1909. Our Legislature having passed an act June 11, 1911, permitting the State Board of Health to make regulations concerning the use of the common drinking cup, the Board at its July meeting adopted the following regulation:

"It shall be unlawful on and after January 1, 1912, to provide a common drinking cup in, or upon the premises of, any public building, hotel, restaurant, theatre, public hall, schoolhouse or store and in any public park, street, railroad station, railroad car or steamboat."

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THE FREE DISTRIBUTION OF ANTITOXINS.

The Legislature having granted the Board an appropriation of eight thousand dollars for the free distribution of diphtheria and tetanus antitoxin a contract for furnishing this was made with the H. K. Mulford Company of Philadelphia at a considerable reduction from the usual retail prices. A plan of distribution was arranged with the town health officers and drug stores which has worked out quite successfully. This distribution we believe has been of distinct advantage to the public as the retail price of antitoxin has been so high that the remedy has not been used sufficiently as a prophylactic measure, nor early enough as a curative agent among the indigent population. This free distribution and the free laboratory examinations for diagnosis have, we believe, caused a marked reduction in the frequency and fatality of this preventable disease. The law, as it now stands, is defective in that no restrictions are placed upon the free distribution, so that the appropriation will be exhausted before the end of the fiscal period for which it was made. We propose to ask the Legislature to amend this Act so that the distribution can be limited to the indigent and to allow the Board to make necessary rules and restrictions regarding its use, so as to prevent unnecessary waste.

THE POLLUTION OF INLAND AND TIDAL WATERS.

For a number of years this Board has been granted authority and has received appropriations to investigate the pollution of streams and the natural waters of the State without power to remedy unsanitary conditions found. While the water supplies of the State, public and private, are generally found to be good, they are liable to deteriorate, providing the present policy is continued.

The ever increasing population makes a greater demand on our limited supply of water, and this growing population increases the sewage to be disposed of. The demand for quick removal of human wastes from the limits of thickly settled districts is recognized as a measure of vital importance to the health and well being of the public; but this gives rise almost immediately to problems connected with the pollution of inland and tidal waters which gradually assume such serious proportions that it becomes necessary to enact laws to eliminate unbearable nuisances and conditions dangerous to the public health. That further laws and regulations are necessary is evident. Some of our rivers and harbors have already reached the limit of sewage pollution, so that some method of sewage disposal other than turning it into the nearest stream must soon be adopted by the

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cities and towns responsible for it. The offensive and dangerous conditions which have resulted from the unrestricted use of our inland and tidal waters for the disposal of unpurified sewage amply demonstrate the fact that state regulations and restrictions are not only advisable but necessary for the public welfare. In many states, notably California, Kansas, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont and Wisconsin, the State Board of Health has general oversight of all inland waters, with authority to make rules and issue orders to prevent pollution, and plans for new water supplies and sewerage systems must be approved by the State Health authorities. The legislation which we advocated two years ago was like that now in force in these states and we propose to ask the incoming Legislature for the passage of a similar bill.

SUPERVISION OVER OYSTERS AND OTHER SHELLFISH.

The occurrence of epidemics of typhoid fever due to the eating of oysters and clams taken from sewage polluted waters has caused special activity on the part of state and national authorities in a combined effort to secure as far as possible such protection of the industry as will relieve consumers of the danger of contracting the disease by this method of infection. The State of Connecticut is especially interested in the problem, as oyster culture is carried on in this State on a large scale and with an intelligence and enterprise exceeding that shown in any other state. It uses so much capital, employs so many persons and produces such large quantities of one of the choicest foods that its promotion and protection should be encouraged. In 1909 the national authorities issued an order forbidding the sale in interstate commerce of oysters taken from waters polluted by sewage, and the order is enforced by the seizure and examination of oysters in process of transportation. It is necessary, therefore, not only to protect the citizens of our own state against any possibility of infection, but also to foster and protect the industry in its shipments to other states.

The State Oyster Investigation Commission of 1909, realizing the necessity for supervision of the oyster industry because of the possible danger to the public health and to place the oyster above suspicion, recommended the passage of a law giving the State Board of Health authority to prevent the pollution of waters where oysters are grown, also a law providing for the inspection of oyster grounds and opening houses by the Board, with authority to make regulations and grant certificates of their sanitary condition when found satisfactory. These bills, however, failed to secure a favorable report from the committee to which they were referred and were consequently rejected. We

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hope that these measures will be considered and passed by the Legislature this year.

MEDICAL INSPECTION OF SCHOOLS.

We have had a law on the statute books for some time permitting school boards to employ medical inspectors. This ought now to be amended so as to make medical inspection of schools obligatory. Some may think it a foolish expenditure of money for which the citizen should not be taxed, but such objections will not bear scrutiny. The authority which has the right to compel attendance at school has the added duty of seeing that no harm comes to those going there, and humanity requires that medical assistance be given children who may suffer through the ignorance or neglect of their parents.

With the lengthening of the school term and the increase in the years of schooling demanded, there has come an advance in the work required. When the standards were low the work was not beyond the capacity of the weaker children, but with fuller courses and higher standards this has changed, and inquiries must be made regarding the children who do not keep up with their classes, in order to diminish the present economic waste from misdirected educational efforts.

These objects can only be obtained by a system of routine inspection of the children by medical men interested not only in public health but also in education.

SMALLPOX.

During the past year there have been three hundred and twenty-six cases of smallpox reported in the State from two centers of infection, one at Willimantic and vicinity, the other at Naugatuck. The cases, as a rule, were very mild, as has been the experience in other states during the past few years. This mild type of the disease makes its detection very difficult owing to the traditional belief that smallpox must of necessity be a very severe disease. This results often in mistaken diagnoses by physicians, or it is not considered necessary by the patient to consult a physician, and the disease is neglected until it has spread quite generally throughout the community. Under the present methods of strict quarantine the expense to a community may be enormous. The expense of the outbreaks in Naugatuck and Willimantic alone exceeds fifty thousand dollars, and it seems to this Board that the method of dealing with smallpox in Minnesota is wise, that is, to put the burden of protection upon the indvidual and not upon the public by removing strict quarantine and in its place placarding the premises and warning all persons to get vac-

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cinated. The protection against smallpox afforded by a successful vaccination is absolute, and in these days when so much attention is given to the prevention of disease, it is strange that many people neglect so certain a preventive of a dread disease. If the present method of caring for smallpox could be done away with, the money now expended for pest houses, special guards, special fees, etc., could be put to a much better public use.

HEALTH ADMINISTRATION.

Before closing we wish to refer briefly to the health administration of the State. Three requisites are necessary for an efficient health organization. Sanitary legislation in harmony with the latest progress in hygiene, efficient organization, and an adequate appropriation to bear the expense involved.

This Board was organized at a time when there was not the interest in public hygiene and preventive medicine that there is to-day, indeed it was questioned by some good authorities whether the state had a constitutional right to create a board to protect the life and health of its people. Coming into existence at such a time it is not to be wondered that the new organization was given scant authority, for besides being a bureau of vital statistics its only other duties were to collect information and give advice when called upon. Various other duties have been added from time to time, such as the registration of medical practitioners, the establishment of a laboratory for the use of physicians in the diagnosis of infectious diseases, the investigation of the pollution of streams and natural waters of the State, and the free distribution of antitoxin, but the executive powers of the Board have remained very much as they were at its beginning. The growing interest in public hygiene and sanitation has very greatly increased the demands made upon us for advice and action by a public which believed the State Board of Health to be possessed with extraordinary powers. In many states the predominance intended for the State Board of Health is given expression in the laws, and the secondary role of county and municipal Boards of Health is emphasized in many by specific declaration of their being subordinate to the State Board of Health. In Massachusetts the State Board of Health has co-ordinate powers with local boards, which power is exercised through a system of district inspectors who by law must be learned in medicine and hygiene. By such a system there is a correlating of the various health agencies resulting in uniform administration of the laws relating to foods, factory hygiene, tenements and the control of infectious diseases.

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We would express our appreciation of the courtesy and co-operation received from the Commissioner on Domestic Animals, the Dairy and Food Commissioner, the County Health Officers and the local Health Officers.

The reports of the County Health Officers and detailed operations of this Board and its laboratories will be found on the subsequent pages of this volume. The report of the Bureau of Vital Statistics is published separately.

Respectfully submitted,

EDWARD K. ROOT, *President,*
THEODORE H. MCKENZIE,
ALBERT W. PHILLIPS,
LEWIS SPERRY,
ARTHUR J. WOLFF,
LOUIS J. PONS,
JOSEPH H. TOWNSEND, *Secretary.*

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SECRETARY'S REPORT

MEETINGS OF THE BOARD

HARTFORD, CONN., December 8, 1910.

A special meeting of the State Board of Health was held December 8, 1910, at the Capitol.

The meeting was called to order at 7 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. J Wolff and the Secretary, also by invitation, Mr. William H. Corbin, Tax Commissioner.

This meeting was called for the purpose of receiving the report of Mr. Newlands and Mr. Ham on the oyster investigation work in New Haven Harbor during the past summer and to transact any other business proper to come before the meeting.

Mr. Newlands read a very complete report of the work done by himself and Mr. Ham in investigating the pollution by sewage of the waters and oysters in New Haven Harbor.

After the reading it was voted that the report be accepted as a report of progress and placed on file.

It was voted that the Secretary be instructed to answer the letter of April 13th from the Board of Equalization and Oyster Investigation Commission, embodying in it the reports of Mr. Newlands and Mr. Ham.

It was voted that the President and Secretary be appointed a committee to appear befor the Board of Control to secure additional funds to make up a deficit of $625.00 in the Laboratory account, resulting from the oyster investigation work.

It was voted that any member of the Board or the Director of the Laboratory can authorize the examination of water samples in the Laboratory whenever in their judgment it is necessary.

In reply to queries from Prof. Conn, it was voted: 1st—that he be authorized to purchase additional milk cases for the Lab-

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oratory. 2nd—That he be authorized to hire an automobile for the purpose of investigating infantile paralysis in Meriden. It was also voted that he be authorized to go to Washington, D. C., to attend the meeting of the Committee having in charge the arrangement of exhibits for the International Exhibition at Dresden.

There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., December 21, 1910.

A special meeting of the State Board of Health was held on Wednesday evening, December 21, 1910. The purpose of the meeting was to consider the estimates of money to be asked of the Legislature for the purposes of the Board and to transact any other business that might properly be brought before the meeting.

The meeting was called to order at 7:10 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. W. Phillips, Dr. A. J. Wolff, Dr. L. J. Pons and the Secretary.

The estimates were first considered and it was voted: To ask the Legislature for $32,000 divided as follows:

General expenses of the Board.....	$10,000
For Bacteriological and Chemical work....	16,000
Salary of Secretary	6,000
	$32,000

Dr. Root then related the result of the interview with the Board of Control for the purpose of securing additional appropriation to make up the deficit in our Laboratory account caused by oyster investigation. He stated that the Board of Control took the ground that they could not grant any additional funds until our entire appropriation was exhausted and it was possible that the deficit might be made up from the appropriation of the Oyster Investigation Commission.

Dr. Wolff called attention to the fact that the Board had no inventory or insurance on its Laboratory equipment at Middletown, and on his motion it was voted that an inventory of the Laboratory equipment be made; also that the Secretary ascertain if the same was insurable and the rate of insurance for three years. Report to be made at the next meeting of the Board.

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A discussion then followed regarding new work and increased power for the Board, and on motion of Dr. Pons it was voted: That a committee of three be appointed to consider how the powers and duties of the State Board of Health can be enlarged. The President appointed as members of the Committee: Drs. Pons, Wolff and Townsend.

There being no further business the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., January 17, 1911.

The regular quarterly meeting of the State Board of Health was held at the Capitol on Tuesday evening, January 17, 1911.

There were present Dr. E. K. Root, Dr. A. J. Wolff, Dr. Louis J. Pons, Mr. T. H. McKenzie and the Secretary.

The minutes of the last regular meeting and of the two special meetings were read and approved

The Treasurer's report of the general expenses of the Board for the quarter ending December 31, 1910, was read and approved; also the report of the Laboratory expenses for the same period.

The Secretary's report gave a summary of his work for the quarter, telling of visits to Bridgeport, Stamford, Westbrook and other places. This report was accepted.

Prof. Conn, the Bacteriologist of the Board, made a report on the work of his Laboratory during the past quarter. In addition to the regular routine work two examinations had been made for the detection of typhoid bacillus carriers and two samples of moulder's clay used in kindergarten work had been sent in for examination to determine whether it could hold the diphtheria bacillus. Prof. Conn also reported an investigation of infantile paralysis which he had made of cases in Middletown and Meriden. There had been thirty-seven cases in each town, thirty-two females and forty-two males. The report suggested fleas as the most probable means of conveying the infection from person to person. The report of Prof. Conn was accepted.

Prof. Conn asked if he should continue sending physicians cards for reports of final diagnosis in cases where typhoid specimens had been sent to the Laboratory for diagnosis, and it was the opinion of the Board that he should continue sending these cards.

The inventory of State property in the Laboratory at Middletown showed apparatus and supplies to the value of $2,219.00, and it was voted to insure the property for $2,000.

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Mr. Newlands, Chemist of the Board, reported regarding the work of water analysis. Owing to the dry weather there had been a large increase in the number of water samples sent to the Laboratory. He had made some experiments to determine the presence of copper in oysters. Mr. Newlands' report was accepted and it was the opinion of the Board that he continue the experiments with oysters.

A committee representing the State Journeymen Plumbers' Association appeared before the Board asking its support for a state plumbing law, in accordance with a bill now pending in the Legislature. It was voted: To refer the matter to our Legislative Committee with power to act.

Dr. W. W. Brackett and Dr. J. Hupert, of New Britain, appeared before the Board urging the revocation of the license of Mrs. Eva Ginsberg, a midwife of New Britain, who had been convicted of a felony in the Superior Court of Hartford County in December, 1905. It was the opinion of the Board that owing to the lapse of time (five years) since the crime was committed, it was not advisable to take any action; however, it was voted to secure the opinion of our legal member, Mr. Sperry, regarding the matter.

The following physicians nominated by the several medical societies were duly appointed on the Medical Examining Boards:

On the Connecticut Medical Examining Board, Dr. Charles A. Tuttle, New Haven, for a term of five years, and Dr. John B. McCook, Hartford, to fill the unexpired term of Dr. H. S. Fuller, deceased.

On the Connecticut Homeopathic Examining Board, Dr. E. H. Linnell, Norwich.

On the Connecticut Eclectic Examining Board, Dr. O. L. Massinger, Bridgeport.

There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., March 22, 1911.

A special meeting of the State Board of Health was held at the Capitol on Wednesday evening, March 22, 1911, for the purpose of considering plans for a sewage disposal plant at Winsted.

The meeting was called to order at 7 p. m. by the President, Dr. E. K. Root.

There were present, Dr. E. K. Root, Dr. A. W. Phillips, Dr. A. J. Wolff, Mr. T. H. McKenzie, and the Secretary; also Sanitary Inspector Ham, Mr. Newlands, Chemist of the Board, Mr.

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W. W. Young, of New York, Mr. R. S. Hurlburt and Mr. W. H. Blodgett of Winsted, and Mr. W. C. Smith, of Winsted and New Hartford.

Mr. W. W. Young, consulting engineer for the Borough of Winsted, presented plans and specifications for sewerage system and disposal plant, which he explained in detail. These plans called for a system of sewers and disposal plant consisting of Imhoff septic tank, roughing filters, sprinkling filters and settling tanks.

Mr. W. B. Smith, representing ice interests at New Hartford, stated that while he did not oppose a sewerage system at Winsted, he did insist that whatever the Board found proper to turn into the stream, it should not prohibit the gathering of ice at New Hartford.

Mr. Blodgett, borough attorney, stated that Winsted was trying to clean up the river for the benefit of all parties.

After questioning Mr. Young and Mr. Hurlburt regarding the plans, it was voted to go into executive session.

It was then voted that Mr. McKenzie, Dr. Wolff, Mr. Ham and Mr. Newlands be a committee to consider the plans and after securing all necessary information to report to the Board.

The meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., April 6, 1911.

A special meeting of the State Board of Health was held on Thursday evening, April 6, 1911, at the Capitol. The purpose of the meeting was to hear and act on the report of the Committee to which had been referred the plans for a sewerage system at Winsted.

There were present Dr. E. K. Root, Dr. A. J. Wolff, Mr. Lewis Sperry, and the Secretary; also Mr. Ham and Mr. Newlands. The President, Dr. E. K. Root, presided and called the meeting to order at 7:25 p. m.

In the absence of Mr. McKenzie, Chairman of the Committee, Dr. Wolff stated that the Committee had a divided report. He presented a report signed by Mr. McKenzie and himself stating that the plans in their present shape could not be accepted and suggested that plans calling for a well approved and well known method of disposal be submitted.

Mr. Newlands then presented a report signed by Mr. Ham and himself, recommending that with the exception of some minor changes the plans submitted be approved.

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After a thorough discussion by all present it was voted to table both reports.

It was then voted to return the plans to the Borough officials of Winsted without approval or disapproval and that Mr. Sperry and the Secretary be a committee to draw up a report to the Borough stating the views of the Board as brought out in the discussion.

The meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., April 19, 1911.

The regular quarterly meeting of the State Board of Health was held at the Capitol on Friday evening, April 19, 1911.

The meeting was called to order at 7:05 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. W. Phillips, Mr. Lewis Sperry, Dr. A. J. Wolff and the Secretary

The minutes of the last quarterly meeting and the two special meetings were read and approved.

The report of the Treasurer was read, accepted and ordered on file.

The Board approved and ordered paid the bill of Mr. Theodore Horton for services in consultation with Mr. McKenzie regarding the plans for the proposed sewerage system at Winsted.

The Secretary made a verbal report of his doings during the previous quarter.

Prof. Conn in his report stated that rabies had again broken out in the State, ten specimens having been sent to the Laboratory for examination during the past quarter. All were positive except one, and all due to a single dog from Lyme which was finally killed in Portland. There had been two specimens of pork examined for trichina, both negative, one specimen for glanders and two for pus.

Prof. Conn stated also that he had been invited to read a paper at a meeting of the National Association of Medical Milk Commissioners to be held in Philadelphia in May and inquired if the Board wished him to go; he also inquired if he should take up the work of making examinations for syphilis and glanders. There is a demand for this work and with a view of taking it up Dr. Root and he had visited the Rockefeller Institute for Medical Research in New York City.

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The report of Prof. Conn was accepted and he was authorized to attend the Milk Convention in Philadelphia as a representative of this Board.

It was also voted that the Laboratory be authorized to prepare itself to make tests for syphilis and glanders as soon as feasible.

Dr. Wolff suggested that in such discussions as that concerning the Laboratory the Board should go into executive session, and gave notice that in future he would so move.

On motion of Mr. McKenzie, it was voted that the Secretary be instructed to issue a circular to the Town Health Officers advising that all watering troughs be cleaned at least once in three months to prevent the spread of glanders.

Mr. Newlands reported that he had examined one hundred and twenty-six samples of water and sewage effluents during the past quarter. Had also spent a considerable portion of his time on the biennial report and in looking up sanitary legislation in other states. He had made a number of examinations of oysters and found appreciable amounts of copper in the green part and none in the white parts. The amount was too small to have any great effect on the public health. He was not yet ready to make a statement and thought it well to examine potatoes and other foods for copper as a comparison.

It was voted that the committee on the Winsted sewerage system be discharged with thanks.

The Examining Board of the Connecticut Medical Society having requested the revocation of the license to practice midwifery of Mrs. Eva Ginsberg of New Britain, it was voted to hold a special meeting and to notify Mrs. Ginsberg to appear and show cause why her license should not be revoked.

There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., May 26, 1911.

A special meeting of the State Board of Health was held on Friday evening, May 26, 1911, at the Capitol, for the purpose of granting a hearing and taking action on request to revoke the license to practice midwifery of Mrs. Eva Ginsberg of New Britain.

The meeting was called to order at 7:05 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. W. Phillips, Mr. Lewis Sperry, and the Secretary. Mrs. Gins-

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berg was present with her attorney, Mr. J. P. Goodhart, of New Haven.

The Secretary stated the case against Mrs. Ginsberg, reading Section 4720 of the General Statutes as amended in 1909 under which the application for revocation was brought, and also read the following papers relating thereto.

1. Complaint of the Examining Board.
2. Copy of record of conviction of Mrs. Ginsberg.
3. Letter to Mrs. Ginsberg notifying her of the complaint and of the meeting to be held on May 26, 1911, at which she could appear.

Mrs. Ginsberg made a statement, and while not denying her guilt asked the clemency of the Board. Mr. Goodhart, her attorney, called attention to the long time that had elapsed since the conviction of Mrs. Ginsberg, exceeding the time allowed for criminal prosecutions and while forming no legal bar to prevent the Board from taking action, it should be considered.

The Board then went into executive session and after a full discussion of the case, it was voted to table until the next regular meeting.

The meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., July 21, 1911.

The regular quarterly meeting of the State Board of Health was held at the Capitol on Friday evening, July 21, 1911.

The meeting was called to order at 7:08 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. W. Phillips, Dr. L. J. Pons, and the Secretary.

The minutes of the last quarterly meeting and the special meeting of May 23rd, were read and approved

The report of the Treasurer was made, accepted and ordered on file.

It being the annual meeting, the election of officers and committees was next in order. The election of officers resulted as follows:

For President—Dr. Edward K. Root.
For Treasurer—Dr. Joseph H. Townsend.
Auditors—Mr. T. H. McKenzie and Mr. Lewis Sperry.
Committee on Water Supplies and Sewage—Mr. T. H. McKenzie, Dr. E. K. Root and the Secretary.

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Laboratory Committee—Drs. Root, Wolff, Phillips, Pons and Townsend.

Member of Board of Examiners of Embalmers—Dr. J. H. Townsend.

Directory of the Laboratory and Bacteriology—Prof. H. W. Conn.

Chemist—Mr. James A. Newlands.

Sanitary Inspector—Mr. George C. Ham.

Managers of County Homes—Dr. E. K. Root, Hartford County; Dr. A. W. Phillips, New Haven County; Mr. T. H. McKenzie, Fairfield County; Dr. J. H. Townsend, New London County; Dr. A .J. Wolff, Middlesex and Windham Counties; Dr. L. J. Pons, Litchfield County; Mr. Lewis Sperry, Tolland County.

The Secretary made his quarterly report, telling of visits to Rockville regarding the public water supply; to Cheshire to inspect a school house, and to Shelton and Seymour regarding typhoid fever outbreaks. The report of the Secretary was accepted.

As Prof. Conn was absent on his vacation, his report was submitted in writing and read by the Secretary.

Mr. Newlands reported on the work of his department and stated that he had in view the purchase of an automobile and asked if this was used in State work would the Board allow him the amount usually expended in car fare and team hire towards the maintenance of the machine.

The reports of Prof. Conn and Mr. Newlands were accepted.

In reply to a query in Prof. Conn's report, it was voted: That Prof. Conn be authorized to make such purchase of apparatus and supplies as his appropriation permitted.

It was voted that Mr. Newlands be allowed towards the maintenance of an automobile such a sum as he would ordinarily spend in his work for car fare and team hire.

Dr. Root reported an interview which he and the Secretary had had with Prof. Rice and Prof. Gregory of the State Geological Survey. They wished the State Board of Health to unite with the Geographical Survey in an examination of the rivers and harbors of the State, not so much in regard to their pollution as to their economic and industrial possibilities. Dr. Root did not think this advisable and the Board concurred in that opinion.

It was voted that the Secretary be directed to prepare regulations concerning the use of the common drinking cup in accordance with a recent Act of the Legislature.

An application for the revocation of the license to practice midwifery of Mrs. Eva Ginsberg, of New Britain, which was

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heard at a special meeting held May 26th, 1911, and tabled until this meeting, was further tabled.

There being no further business the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M., D., *Secretary.*

HARTFORD, CONN., October 25, 1911.

The regular quarterly meeting of the State Board of Health was held at the Capitol on Wednesday, October 25, 1911.

The meeting was called to order at 7:10 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Dr. A. W. Phillips, Mr. T. H. McKenzie, Mr. Lewis Sperry, Dr. A. J. Wolff, Dr. L. J. Pons, and the Secretary.

The minutes of the last quarterly meeting were read and approved.

The report of the Treasurer was made, accepted and ordered on file.

The report of the Secretary was made, telling of visits to Seymour, Orange, Enfield, Twin Lakes, Manchester, West Haven, Derby, Deep River and Torrington. The visit to Torrington was in reference to the outbreak of typhoid fever there. The report of the Secretary was accepted.

The Secretary having spoken in his report of the typhoid fever epidemic in Torrington, Mr. Newlands, who had investigated the outbreak, was called upon for his report. In this report, which was a preliminary one, Mr. Newlands stated that when he began his investigation the water supply was already under suspicion. Examination of this supply had shown it to be contaminated and a disinfecting plant was at once installed which resulted in a marked improvement in the quality of the water. The borough water supply is received from two reservoirs known as the Marshall Lake system and the Hatchalusie-Crystal Lake system, and it had been the general belief that the epidemic was caused by the use of the water from Marshall Lake. This was shown not to be the case, as Mr. Newlands demonstrated by maps showing the distribution in the borough of the water from the two systems and the location of the typhoid cases. The question of sending the report to Torrington being raised, it was voted that Mr. Newlands send to the Torrington authorities through the President and Secretary a preliminary statement of the actual condition of the water as soon as present analyses are completed, and that a final report be

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made by Mr. Newlands and the Secretary and submitted to the Board.

Prof. Conn, Director of the Laboratory, reported, stating that during the quarter there had been a considerable demand for typhoid examinations, especially from Torrington. Reply cards in typhoid examinations had been sent out with the same result as before. The Laboratory was not making examinations for gonorrhoea although it was work usually done by the state laboratories. Among the work done there had been specimens examined for meningitis, pork for trichina, pus as to whether the bacteria was the streptococcus or staphylococcus. There had been quite a number of requests to have examinations made for glanders, especially from one veterinarian. The United States Department of Agriculture was anxious that state laboratories take up the examination for glanders by the complement fixation test in order to stamp out the disease, and had offered to furnish all the materials used, such as could be furnished by their laboratory. He had had an offer of sheep and barn in which to keep them, and the only expense would be that of keeping them. The milk work was becoming heavier and heavier. There had been thirty samples of watered milk examined during the quarter and seventy-six which contained less than the legal amount of fat. The report of Prof. Conn was accepted and it was voted that he be authorized to make examinations for glanders.

Mr. Newlands, Chemist of the Board, reported that there had been an average of fifty-eight samples of water examined per month during the quarter. He had made inspection visits to Groton, Greenwich, Bantam Lake, Norwich, Shelton, Stamford and Torrington. The report of Mr. Newlands was accepted.

Mr. McKenzie, Chairman of the Committee on Water Supplies and Sewage, reported a visit to Thompsonville and approval of plans for an additional water supply there.

In accordance with the provisions of Chapter 96 of the Public Acts of 1911, the Board adopted the following regulation concerning the use of the common drinking cup:

"It shall be unlawful on and after January 1, 1912, to provide a common drinking cup in or upon the premises of any public building, hotel, restaurant, theatre, public hall, schoolhouse or store and in any public park, street, railroad station, railroad car, or steamboat."

The matter of awarding the contract for furnishing antitoxin for free distribution as provided in an Act passed by the Legislature of 1911 was referred to a Committee composed of Dr. Root, Dr. Wolff, and the Secretary.

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There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., January 16, 1912.

The regular quarterly meeting of the State Board of Health was held on Tuesday evening, January 16, 1912, at the Capitol.

The meeting was called to order at 7 p. m. by the President Dr. E. K. Root.

There were present Drs. Root, Phillips, Wolff, Fons, Mr. T. H. McKenzie, Mr. Lewis Sperry and the Secretary.

The minutes of the last quarterly meeting were read and approved.

The report of the Treasurer was made and accepted.

The Secretary made a verbal report of his work during the quarter, and his report was accepted.

It was voted to suspend the regular order of business and hear a Committee of the New Haven Public Health Association relative to the distribution of antitoxin. This Committee was composed of Mr. George E. Hinman, County Health Officer of Windham County, Dr. W. P. Wilson of Wallingford, and Dr. Gould Shelton of Shelton. They desired to have the distribution of antitoxin limited to the indigent, and asked also that the Board make a ruling that a requisition by a physician for diphtheria antitoxin be considered as a report of a case of diphtheria. It was decided by this Board that it had no power to distribute antitoxin otherwise than provided in the statutes, but thought that a patient for whom antitoxin was ordered should be quarantined as having diphtheria until a bacteriological examination proved the contrary, and it was voted: That the Secretary be instructed to prepare and distribute to the Town and County Health Officers a circular regarding such quarantine, in order that there might be uniform action throughout the State.

Prof. Conn, Director of the Laboratory, made his report for the quarter, stating that 1,767 specimens had been examined in the Laboratory exclusive of the milk work. He had made arrangements and had already begun work on the complement fixation test for glanders; fourteen specimens, all negative, had been so far examined. He had been asked to attend the meeting of the State Veterinary Association in February to explain the work the Laboratory was prepared to do in the diagnosis of glanders. Eight hundred and ninety samples of milk had been examined with the usual amount of adulterated milk, among which was one sample of watered skimmed milk from Middletown. This made 3,439

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specimens examined in the Laboratory during the past three months. He reported attending a meeting of the National Bacteriological Association in Washington, D. C., and had been to Bristol where he had talked to the city officials regarding milk inspection which they are preparing to take up vigorously. The report of Prof. Conn was accepted.

Mr. Newlands, Chemist of the Board, reported that an average of forty-four samples of water and sewage were examined each month, and he read a preliminary report of the typhoid fever epidemic in Torrington last fall. The report was accepted and it was voted: That a Committee consisting of Mr. Newlands and the Secretary be appointed to complete the report of this epidemic and send copies to the Torrington officials as well as to members of the Board.

The following report was made by Drs. Wolff and Townsend of a committee meeting held in New Haven, November 23, 1911, for the purpose of hearing parties interested in the adoption of a regulation for the town of Hamden prohibiting the unloading of New York manure during certain months of the year:

"A special meeting of the State Board of Health was called at the City Hall, New Haven, on November 23, 1911, for the purpose of granting a hearing to persons interested in a regulation submitted to the Board for its approval by Dr. Lay, Town Health Officer of Hamden. The proposed regulation is as follows: 'Regulation No. 30 ,Town of Hamden. No New York manure shall be unloaded within the boundaries of this town between the 15th day of June and the 1st day of October of each year.'

"The members of the Board present were Dr. A. J. Wolff and the Secretary, Dr. J. H. Townsend. There being no quorum of the Board present, the members organized as a Committee with Dr. Wolff, Chairman, and Dr. Townsend, Secretary, and proceeded with the hearing. The meeting had been called as provided by law, due notice having been given to the First Selectman and the Health Officer of the town of Hamden. There were about twenty residents of the town of Hamden present, Dr. Lay, the Health Officer, being the only town official.

"Attorney E. S. Thomas represented those in favor of the regulation, and Attorney D. E. Fitzgerald represented the Farmers' Association of Highwood opposing it. It appeared from the evidence that nearly all the New York manure coming into the town of Hamden is unloaded at a place called Broadbent's Crossing in the village of Highwood near the New Haven city line. The locality is well built up with dwelling houses and one factory, a few hundred feet from the crossing, employs from 200 to 400 hands. It was shown that the stench arising from the unloading of this fertilizer was not only very disagreeable but

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caused nausea in some susceptible persons, and was very trying to any sick in the neighborhood. Another nuisance complained of was the flies from the manure which swarmed about the locality. It is well known that the chief reason for buying this manure in the summer time is the fact that under the sanitary regulations of New York City it must be removed at once, so that it can be purchased at a much less cost during the summer months.

"Your Committee is not unmindful of the value of this fertilizer to the farmer and market gardener, but believes that the regulation is not unreasonable and therefore recommends its approval as submitted."

The report of the Committee was accepted and the regulation approved by unanimous vote.

An invitation was accepted to send a delegate to the Council on Public Health and Legislation of the American Medical Association in Chicago, February 26th and 27th, and Dr. E. K. Root was appointed delegate with the Secretary as alternate.

A set of Sanitary Regulations submitted by the Board of Health of Hartford was approved by vote.

It was voted: To hold a conference of Health Officials of the State in Hartford during the month of March or April.

Nominations to the State Medical Examining Boards were approved as follows:

Connecticut Medical Society—Dr. Samuel M. Garlick, Bridgeport.

Connecticut Homeopathic Medical Society—Dr. William Pitt Baldwin, New Haven.

Connecticut State Eclectic Association—Dr. James E. Hair, Bridgeport.

There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., April 24, 1912.

The regular quarterly meeting of the State Board of Health was held at the Capitol, on Wednesday, April 24, 1912.

The meeting was called to order at 7 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. J. Wolff, and the Secretary.

The minutes of the last quarterly meeting were read and accepted.

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The report of the Treasurer was made, accepted and ordered on file.

The Secretary made a verbal report of his work for the quarter, which was accepted.

Prof. Conn, Director of the Laboratory, reported a falling off in the examinations for diphtheria during the preceding quarter. There had been 163 examinations for typhoid and 421 for tuberculosis. The first positive specimen of paratyphoid had been examined. Fifty-six specimens of glanders had been received, these coming from all parts of the State. He had attended in January, the meeting of the Committee on Milk Standards held in Homer, N. Y., and the final meeting in New York City. Prof. Conn asked the advice of the Board relative to the reporting of results of tuberculosis examinations to the Health Officers by name, also referred to a letter from Dr. Finch, Health Officer of Enfield, asking that the Board issue a pamphlet on milk production. The report of Prof. Conn was accepted.

It was voted: That hereafter the Laboratory report to the Health Officers the names of the tubercular patients for whom sputum examinations are made.

It was also voted: That Prof. Conn be appointed a Committee to confer with Dairy Commissioner Potter for the purpose of publishing a joint circular on milk production.

Mr. Newlands, Chemist of the Board, reported that one hundred and three samples of water and sewage had been examined during the past three months. His report on the typhoid epidemic at Torrington had been completed, and he had spoken before the Winsted Business Men's Association regarding their water supply. In Cromwell and Willimantic, where the water supplies had been shown to be bad, not much interest was being taken in the matter. In Willimantic colon bacilli were being found in the water continually. Either conditions should be improved or some new supply obtained. The report of Mr. Newlands was accepted.

It was voted: That the proper authorities in Willimantic be notified that Mr. Newlands in his examination of their water supply for the past two years had repeatedly found evidence of contamination, and unless a pure supply is provided a serious epidemic of some water borne disease will result, as did in Torrington last fall.

It was voted: That a special meeting be held on Friday, May 3, 1912, to consider and take action on the application of the Connecticut Medical Examining Board to revoke the license to practice midwifery of Mrs. Eva Ginsberg of New Britain.

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It was voted to publish the Proceedings of the Sixth State Conference of Health Officials held in Hartford April 3, 1912.

There being no further business the meeting adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., May 3, 1912.

A special meeting of the State Board of Health was held on Friday evening, May 3rd, 1912, at the Capitol, for the purpose of considering an application to revoke the license to practice midwifery of Mrs. Eva Ginsberg of New Britain.

The meeting was called to order at 7:10 p. m. by the President, Dr. Root.

There were present Dr. E. K. Root, Dr. A. W. Phillips, Dr. A. J. Wolff, Dr. L. J. Pons, Mr. Lewis Sperry and the Secretary; also Drs. Brackett and Hupert of New Britain, and Mrs. Ginsberg and her attorney, Mr. J. F. Goodhart of New Haven.

This application to revoke Mrs. Ginsberg's license had been previously considered at a special meeting held May 26, 1911, at which time it was laid on the table. It was now voted to take the application from the table, and Drs. Hupert and Brackett spoke in support of it, while Mr. Goodhart opposed it. After all who desired to speak had been heard, the Board voted to go into executive session. After a careful consideration of the case, the following vote was passed:

"That on May 3, 1912, the State Board of Health had under consideration the application of The Connecticut Medical Examining Board to revoke the license to practice midwifery of Mrs. Eva Ginsberg of New Britain, granted her by this Board in 1902. The only evidence offered which we could consider was her conviction in the Superior Court of Hartford County at the December, 1905, term. In view of the long time that has elapsed since this conviction, and in view of the further fact that this Board is of the opinion that Eva Ginsberg has not intentionally violated the law since that time, we do not feel justified in revoking her license."

The meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

HARTFORD, CONN., July 12, 1912.

The regular quarterly meeting of the State Board of Health was held on Friday evening, July 12, 1912, at the Capitol.

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In the absence of the President the meeting was called to order by the Secretary at 7:05 p. m., and Dr. A. W. Phillips chosen President, *pro tem.*

There were present, Mr. T. H. McKenzie, Dr. A. W. Phillips, Dr. A. J. Wolff, Dr. L. J. Pons and the Secretary.

The minutes of the last quarterly meeting and special meeting were read and approved.

The report of the Treasurer was made, accepted and ordered on file.

It being the annual meeting, the election of officers was next in order. The election resulted as follows:

For President—Dr. E. K. Root.

For Treasurer—Dr. Joseph H. Townsend.

Auditors—Mr. T. H. McKenzie and Mr. Lewis Sperry.

Committee on Water Supplies and Sewage—Mr. T. H. McKenzie, Dr. E. K. Root and the Secretary.

Laboratory Committee—Drs. Root, Phillips, Wolff, Pons and Townsend.

Member of Board of Examiners of Embalmers—Secretary Townsend.

Director of Laboratory and Bacteriologist—Prof. H. W. Conn.

Chemist—Mr. James A. Newlands.

Sanitary Inspector—Mr. George C. Ham.

Managers of County Homes—Dr. E. K. Root, Hartford County; Dr. A. W. Phillips, New Haven County; Dr. J. H. Townsend, New London County; Mr. T. H. McKenzie, Fairfield County; Dr. A. J. Wolff, Windham and Middlesex County; Dr. L. J. Pons, Litchfield County Mr. Lewis Sperry, Tolland County.

The Secretary made his quarterly report telling of visits to Ansonia, Seymour, Oxford, Wallingford and Roxbury in consultation with the Health Officers in regard to diagnosis in suspected cases of smallpox; also a visit to Bridgeport in reference to an outbreak of typhoid fever due to the eating of raw clams gathered in Bridgeport harbor. Among other places visited were Willimantic, South Norwalk, New Preston, Branford and Middletown. The report of the Secretary was accepted.

It was voted: That the Chemist of the Board be instructed to examine the clam beds in Bridgeport harbor and make a report to the Board.

Prof. Conn, Bacteriologist and Director of the Laboratory, reported that Mr. Lathrope had left the Laboratory to accept a position elsewhere and Mr. Mickel had been transferred from the bacteriological to the chemical side to take his place. Mr. R. V. Storey had been engaged as an assistant in the bacter-

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iological laboratory. The work had increased during the quarter, due chiefly to milk and glanders examinations. One hundred specimens had been examined for glanders and of these nineteen were positive. He had had the opportunity to compare his results with work done at the Department of Agriculture in Washington; they usually agreed, but not always, and he proposed to spend the first week in September in Washington studying their methods. He had been asked to take up the study and examination of contagious abortion in cattle. There was a demand for the diagnosis of this condition that stockmen might know what cows to breed from. He did not think, however, that this was work for the State Board of Health. He had held a conference with Dairy Commissioner Potter regarding a circular on milk production. Mr. Potter had been glad to co-operate and assume half the expense of publication and it would soon be issued. He called attention to the fact that the Dairy Commissioner can prosecute for selling illegal milk only on the examination of the Agricultural Experiment Station. The law should be so modified that prosecutions can be brought on examinations by the Station or our Laboratory. Health Officers, however, can take cases to Court on the report of this Laboratory.

The report of Prof. Conn was accepted, and the suggestion regarding milk prosecutions referred to the Legislative Committee.

Mr. Newlands, Chemist, reported that there had been little except routine work done in the Laboratory during the quarter. One hundred and seven samples of water and sewage had been examined. He had visited Greenwich and Orange, had finished the inspection of the Stamford watershed and had begun that of Guilford. He suggested that cards be sent out to the water companies for data as to the size and type of their plants.

The report was accepted, and the recommendations regarding the data from water companies adopted, the cards to be sent out from the office of the Board.

It was voted that such members of the Board as wished to attend the meeting of the American Public Health Association to be held in Washington in September be authorized to attend at the expense of the Board, also that the Bacteriologist and Chemist be authorized to attend this meeting.

There being no further business, the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

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HARTFORD, CONN., October 17, 1912.

The regular quarterly meeting of the State Board of Health was held on Thursday, October 17, 1912, at the Capitol.

The meeting was called to order at 7 p. m. by the President, Dr. E. K. Root.

There were present Dr. E. K. Root, Mr. T. H. McKenzie, Dr. A. W. Phillips, Mr. Lewis Sperry, Dr. A. J. Wolff and the Secretary.

The minutes of the last quarterly meeting were read, accepted and ordered on file.

Dr. E. J. McKnight, Chairman of the Committee on Public Policy and Legislation of the Connecticut Medical Society appeared and asked that the Board review the case of the revocation of the license to practice midwifery of Eva Ginsberg. After hearing Dr. McKnight, the Board voted to adhere to its former action and Mr. Sperry and the Secretary were appointed to prepare a reply to the written communication submitted by Dr. McKnight.

The Secretary made his quarterly report in which he told of visits to Orange, Bridgeport, Greenwich, Bantam Lake, Sharon, Huntington, Plainville, New Britain, New Canaan, Pomfret, Ansonia and Middletown. He also made a report of the meeting of the American Public Health Association held in Washington, which he attended as delegate of the Board.

Prof. Conn, Bacteriologist of the Board, made his last quarterly report for the year and gave a summary of the year's work. During the year 10,967 examinations of milk, water and bacteriological specimens had been made. The average cost of these had been thirty-four cents for ordinary specimens and fifty-one cents for milk analyses. About one thousand more specimens had been examined during the quarter than for the corresponding period of last year, the increase being principally in glanders and milk. In the future he intends to use both the fixation test and the agglutination test in examinations for glanders.

Mr. Newlands, the Chemist of the Board, reported besides the routine work, an examination of clams taken from Bridgeport harbor, a visit to New Canaan to advise the Water Company regarding discoloration of water which was giving a good deal of trouble, also a visit to Greenwich with the Secretary in reference to some typhoid fever cases.

The reports of the Secretary, Bacteriologist and Chemist were accepted.

Mr. T. H. McKenzie, Chairman of the Committee on Water Supplies and Sewage, reported an inspection of proposed location and plans for a sewage disposal plant at Plainville and rec-

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ommended their approval by the Board. Mr. Sperry called attention to the position taken in the Winsted case, that the Board had no statutory authority to approve such plans It was voted to accept the report of the Committee, but to withhold formal approval of the plans submitted.

Mr. McKenzie also reported an investigation by himself and the Secretary of a small typhoid outbreak at Pomfret. No definite source of the trouble was found, but several unsanitary conditions were located; among these was the sewage disposal at the hotel, the sewage being run on the surface of a meadow where it was accessible to flies. Recommendations were made for the abatement of the nuisances.

A petition was received from O. A. Winter and thirty other citizens of Meriden asking for the abatement of a nuisance arising from a public dump on the property of the State. The rubbish was burned and it was the smoke that was complained of. The matter was referred to the Secretary and the County Health Officer for investigation.

There being no further business the meeting then adjourned.

Attest:

JOSEPH H. TOWNSEND, M. D., *Secretary.*

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GENERAL HEALTH OF THE STATE

The health of the state for the biennial period ending September 30, 1912, compares favorably with that of previous years. The total number of deaths reported by local registrars during the year 1911 was 17,554, which is a death rate of 15.4 per thousand of population. In 1912 there were 17,275 deaths, which equal a death rate of 14.9 per thousand, the latter being the lowest annual death rate recorded in the past thirty years.

Among the duties prescribed in the statutes for the State Board of Health is that of investigating the prevalence of diseases and the sources of mortality. This Board publishes each year a separate report upon vital statistics in which is given a detailed statement of the causes of death and the relation to them of age, sex, color, occupation, locality, etc. We here refer briefly only to some of the more prominent diseases, particularly to that class known as communicable diseases which are also largely preventable. The charts given on the following pages show the variations in death rates from year to year and it will be noticed that while during the past thirty years there has been a uniform decline in the death rate from most of the infectious diseases, there has been a constant increase in the deaths from certain other diseases such as Bright's disease, apoplexy and cancer. This is as would be expected, the lower death rates from the preventable diseases common to early life have so lengthened the duration of human life, that more people now reach that period in which they are liable to the diseases of degeneration.

PNEUMONIA.

Pneumonia now causes more deaths in Connecticut than any other single disease, outranking consumption which formerly led. During the year 1911 there were 1,722 deaths including those from broncho-pneumonia, and 1,704 deaths in 1912. Of the 1,722 deaths from pneumonia in 1911, 455 or 26 per cent. occurred in children under two years of age and 345 or 20 per cent. were of persons over seventy years of age. From a study of

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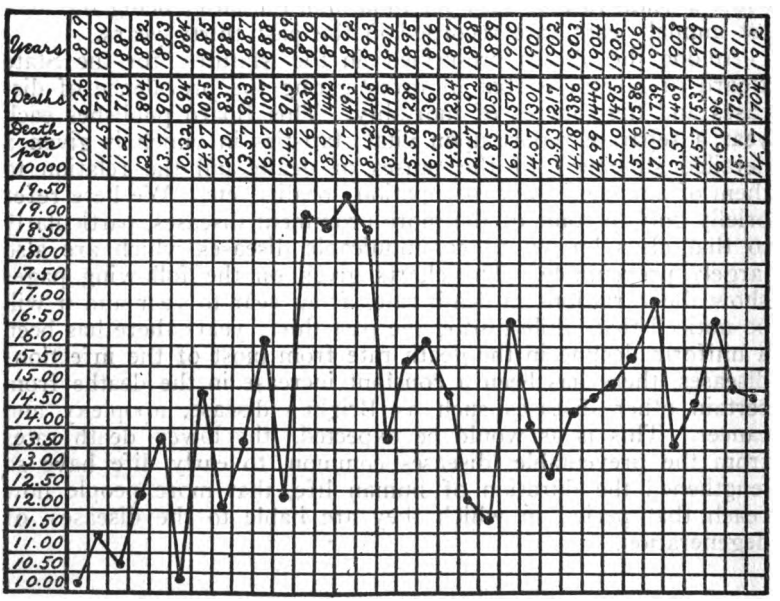
the death rates throughout the state it is seen that the mortality is higher in the larger cities than in the towns or rural districts, which would indicate that density of population has an influence on the prevalence of this disease. As pneumonia is an infectious disease the campaign against tuberculosis which has resulted in the enactment of such laws as the anti-spitting law, the abolition of the common drinking cup, together with a better understanding of the value of fresh air and ventilation, may be the means of lessening the death rate from pneumonia and other diseaees of the respiratory system Chart I shows that while there were fewer deaths from pneumonia during the past two years than in 1910, there has been a gradual increase in the death rate for the past thirty-four years.

CHART I.—SHOWING DEATHS IN CONNECTICUT FROM PNEUMONIA PER 10,000 POPULATION FOR 34 YEARS, 1879-1912 INCLUSIVE.



CONSUMPTION

During the year 1911 there were reported by the local Health Officers 1,606 cases of pulmonary tuberculosis and 1,645 in 1912. The deaths in 1911 numbered 1,386, and in 1912, there were 1,374 deaths, which is equivalent to a death rate of 12.2 per ten thousand of population for 1911, and 11.9 per ten thousand for 1912. These are the lowest death rates from this disease so

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far recorded. Chart II., which covers a period of sixty-four years, shows that there has been a gradual decline in the death rate since 1849, although more rapid since the discovery of the tubercle bacillus in 1882. The second curve represents the general death rate for the same time. During the early part of this period of sixty years the registration of deaths was, of course, very incomplete, but the two curves well illustrate the percentage of tubercular deaths to the deaths from all causes. Formerly one out of every six deaths was due to consumption, while at the present time this has been reduced to one in twelve. The knowledge of its infectious character and better hygienic living have contributed to this result and there is no doubt that the mortality will continue to lessen in the years to come.

In addition to the deaths from consumption or pulmonary tuberculosis, there were 314 deaths from other forms of tuberculosis in 1911.

The following table gives the deaths from the various forms of tuberculosis by ages and sex:

Causes of Death.	Under 1	1 to 2	2 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80 to 90	Not stated	Male	Female	Total
Tuberculosis (total),																1700
Tuberculosis of lungs,	8	12	8	15	112	369	332	256	149	85	29	7	4	791	595	1386
Acute miliary tuberc'sis,	3	2	2	3	9	15	12	14	5	1			1	31	36	67
Tubercular meningitis,	24	25	33	15	9	5	3	4		1				74	45	119
Abdominal tuberculosis,	6	6	5	1	3	7	13	7	8	7	1			28	36	64
Potts' disease,			2		4	2		1		3	4			7	9	16
White swellings,	1		1	2	1		1							5	1	6
Tuberc'sis, other organs,	2		1		1	4	6	6	2	2	1			10	15	25
Disseminated tuberc'sis,	2	1		1	2	5	3	2		1				12	5	17
Rickets,	5	6	1			1	1							6	8	14

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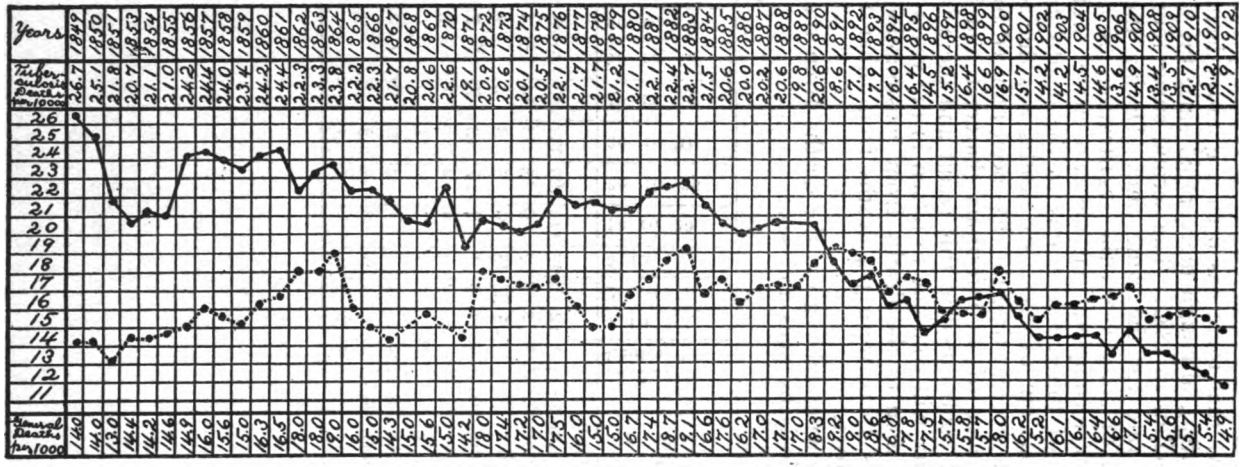
CHART II.—SHOWING DEATHS IN CONNECTICUT FROM PULMONARY TUBERCULOSIS PER 10,000 POPULATION FOR 64 YEARS, 1849-1912 INCLUSIVE.

Tuberculosis death rate per 10,000.



General death rate per 1,000.

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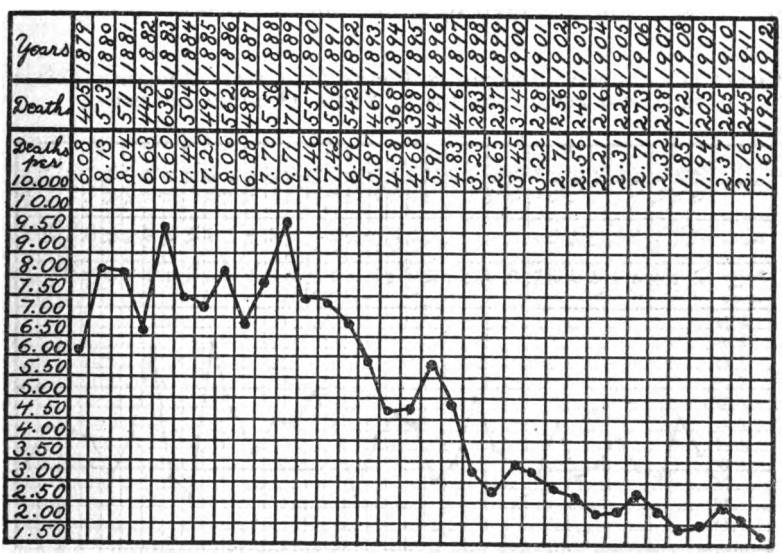
DIPHTHERIA.

There were 2,217 cases of diphtheria reported in the state in 1911 with 245 deaths, and 1,950 cases reported in 1912 with 192 deaths, which is equivalent to a death rate of 2.16 per ten thousand of population in 1911, and 1.67 per ten thousand in 1912. It will be seen from an inspection of Chart III. that the death rate in 1912 was the lowest recorded in thirty-four years. It can be safely assumed that the assistance given by the state in the way of free laboratory examinations for diagnosis and free antitoxin has contributed to this result.

CHART III.—SHOWING DEATHS IN CONNECTICUT FROM DIPHTHERIA PER 10,000 POPULATION FOR 34 YEARS, 1879-1912, INCLUSIVE.



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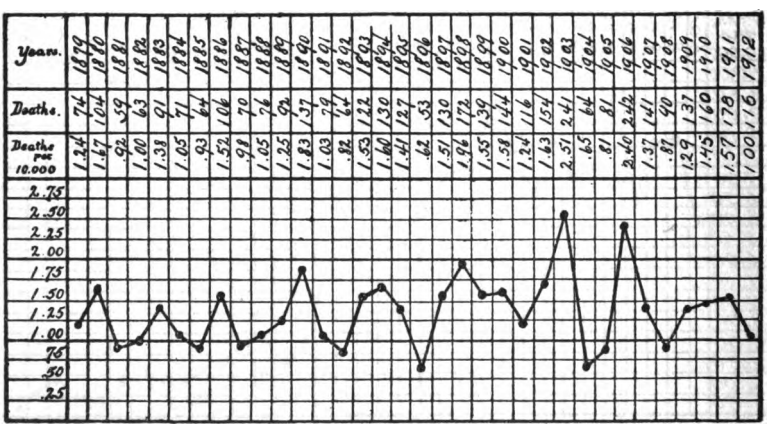
WHOOPING COUGH.

There were 1,195 cases of whooping cough reported in 1911 with 178 deaths, and 1,127 cases reported in 1912 with 116 deaths. In Connecticut whooping cough causes more deaths than either measles or scarlet fever and about two-thirds as many as diphtheria, besides being recognized as one of the predisposing causes of tuberculosis, so that it is not such a trivial disorder as it is sometimes regarded. The susceptibility to the disease diminishes with advancing age and beyond the age of five the mortality is slight, therefore, young children especially should be carefully guarded from exposure to infection. Chart IV. shows the death rate each year for the past thirty-four years and it will be noticed that the curve is very irregular, a high death rate being followed by a low rate for two or three years.

CHART IV.—SHOWING DEATHS IN CONNECTICUT FROM WHOOPING COUGH PER 10,000 POPULATION FOR 34 YEARS, 1879-1912 INCLUSIVE.



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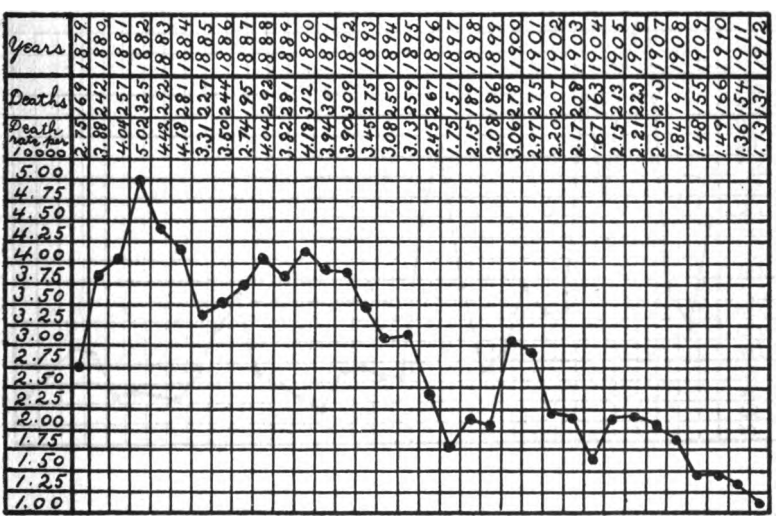
TYPHOID FEVER.

Typhoid fever was reported from 92 towns in 1911, there being 1,329 cases with 154 deaths. In 1912 there were 1,037 cases reported from 82 towns, with 131 deaths. A serious outbreak occurred in Torrington in the fall of 1911, a report of which is given elsewhere. At the onset of this epidemic some of the physicians advocated typhoid vaccination and about four hundred persons were inoculated. The borough employed eighty nurses and of these forty-five were vaccinated, the others refused it. No cases of typhoid developed among the vaccinated, except one man after his second inoculation ran a very mild and short course of fever. Two cases of typhoid occurred among the unvaccinated nurses. Notwithstanding this epidemic the typhoid death rate has continued to decrease as shown in Chart V.

CHART V.—SHOWING DEATHS IN CONNECTICUT FROM TYPHOID FEVER PER 10,000 POPULATION FOR 34 YEARS, 1879-1912 INCLUSIVE.



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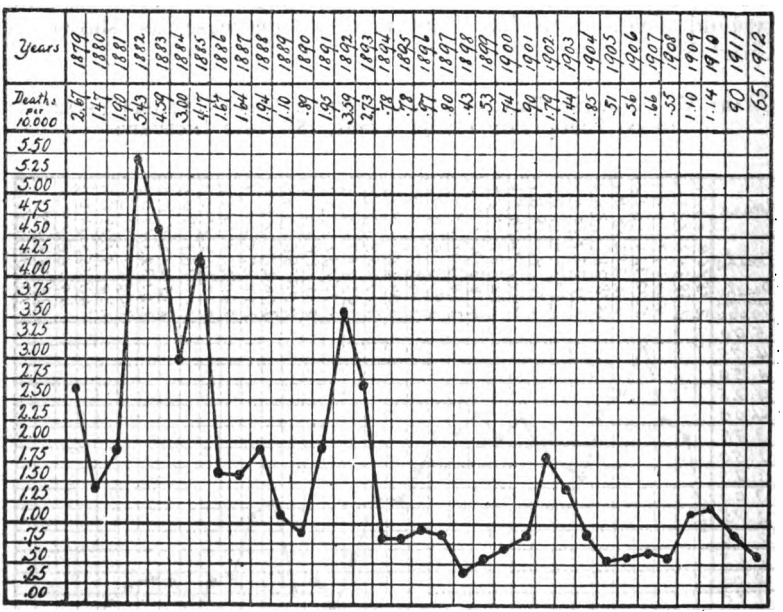
SCARLET FEVER.

There were 2,711 cases of scarlet fever reported by the Town Health Officers in 1911, with 103 deaths, and 1,768 cases reported during the year 1912, with 75 deaths. The disease has continued in the mild form in which it has prevailed during the past few years, making it sometimes difficult to recognize.

Chart VI. shows the decline in the death rate during the past eighteen years, the disease being less fatal than formerly.

CHART VI.—SHOWING DEATHS IN CONNECTICUT FROM SCARLET FEVER PER 10,000 POPULATION FOR 34 YEARS, 1879-1912 INCLUSIVE.



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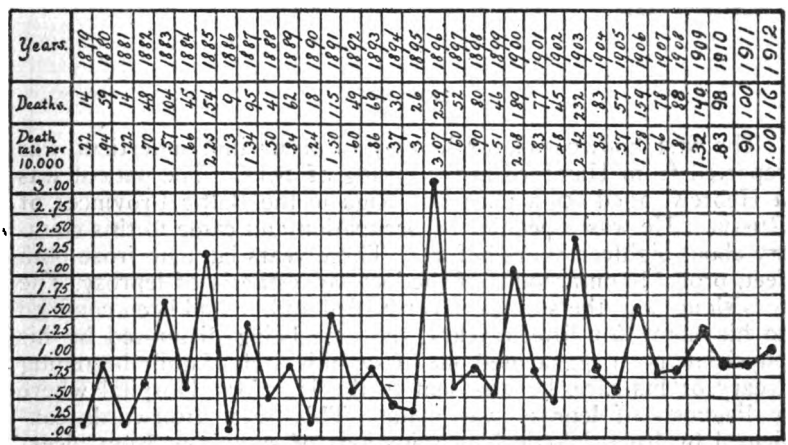
MEASLES.

There were 5,135 cases of measles reported during the year 1911, with 100 deaths, and 6,123 cases reported during the year 1912 with 116 deaths. Measles is a serious disease of childhood and very contagious in the early stages before the characteristic symptoms appear. Two-thirds of the deaths occur under two years of age and nearly all before the age of five years, so that it is very important to protect young children from exposure to this disease.

Chart VII. shows the death rate each year for the past thirty-four years.

CHART VII.—SHOWING DEATHS IN CONNECTICUT FROM MEASLES PER 10,000 POPULATION FOR 34 YEARS, 1879-1912 INCLUSIVE.



SMALLPOX.

Two cases of smallpox from one town were reported in the State in 1911. In 1912 there were 326 cases reported from fourteen towns. Naugatuck and Willimantic had most of these, there being only a few isolated cases in the other twelve towns. The disease was mild in character and no deaths occurred.

CEREBRO-SPINAL FEVER.

There have been no epidemics of this disease during the past two years, although sporadic cases have been reported from

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various parts of the State. Forty-seven cases from nineteen towns were reported in 1911 and 17 cases from nine towns in 1912.

INFANTILE PARALYSIS.

Following the outbreak of infantile paralysis in 1910, when 168 cases were reported, it was feared that the disease would be more prevalent the next year, but fortunately this did not happen. Forty-five cases were reported in 1911 with nine deaths and 27 of these were from New Haven, the other 18 cases coming from thirteen towns. In 1912, 31 cases were reported in thirteen towns, Bridgeport leading with five cases, Waterbury and Greenwich next with four cases each. Four-fifths of the cases reported in each year occurred between June 1st and December 1st.

LEPROSY.

The first known case of leprosy to occur in Connecticut was reported from Hartford in the spring of 1911. The patient was a Hebrew, aged 60, a native of Riga in the Baltic Provinces of Russia. He was a peddler by occupation and came to this country about eighteen years before. Three years later he froze both feet, probably on account of the local anaesthesia of leprosy. The toes sloughing, the stumps never healed and he had been confined to his home for fifteen years, the case being diagnosed by his physician as an aggravated one of syphilis. His family becoming weary of his care, he was sent to the Hartford Hospital where a diagnosis of leprosy was made. This was afterwards confirmed by bacteriological examinations of scrapings from ulcers and sections of skin sent to Prof. Wm. H. Welch, of Baltimore. The case was turned over to the Department of Charities of Hartford and the patient with an attendant isolated in a building on the town farm where he has since remained. The patient's family, with whom he had lived, consisted of a wife and three children, the youngest about fifteen years of age. They are all now in good health with no symptoms of the disease, although it might be added that being intelligent and cleanly in their mode of living, the father had been avoided and left very much to care for himself, as he was supposed to have syphilis.

RABIES.

There have been no cases of human rabies reported during the

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past two years, although there have been some few cases among animals. In 1911 twenty specimens were sent to the laboratory for diagnosis, of which ten were positive, and in 1912 thirty-seven, of which twenty-three were positive.

GLANDERS.

There seems to be no doubt that glanders has been on the increase in the State during the past few years. It is an infectious disease due to the bacillus Mallei. It is particularly a disease of horses, but communicable to some other animals. The disease is rare in man, but may be seen in those who work about horses. It may be more common than we know, such cases perhaps being diagnosed as mixed infections, pyemia, syphilis, etc. There have been three cases of human glanders reported during the past two years, all from New Haven. The first was a veterinarian, who died in October, 1911; the second was a hostler who died in February, 1912, while the third, a teamster, recovered after a slight infection.

DEATHS AMONG CHILDREN.

The deaths among children under five years of age in 1911 numbered 4,451, which is a death rate of 39.14 per ten thousand of population, or 25.3 per cent. of the total mortality. In 1912 there were 4,412 deaths or 38.1 per ten thousand population.

The following table and charts cover a period of twenty-four years (1889-1912) and show the mortality in children under one year of age, and from one to five years of age. Our Vital Statistic Report for 1911 contains a table showing the deaths of infants by days, weeks and months with the more prominent causes of mortality. From this we learn that of the 3,247 infants dying under one year, 899 were under a week old and 1,364 under one month, the principal causes of death being premature birth, congenital debility and malformations. Between the ages of one and twelve months, diarrhoea and enteritis lead as causes of death with pneumonia second. These charts and tables deserve careful tudy by those interested in infantile mortality.

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TABLE SHOWING MORTALITY AMONG CHILDREN UNDER ONE YEAR AND FROM ONE TO FIVE YEARS; ALSO THE RELATION TO TOTAL BIRTHS AND DEATHS.

Year.	Total Mortality.	Mortality under 1 yr.	Mortality 1 to 5 yrs.	Total births.	Annual No. of deaths under 1 yr. to 1,000 living births.	Percentage under 1 yr. to total deaths.	Percentage of deaths 1 to 5 yrs. to total deaths
1889	12,529	2,440	1,135	17,176	142	19.4	9.0
1890	13,665	2,540	1,162	17,394	145	18.5	8.5
1891	14,385	2,759	1,242	18,557	148	19.1	8.6
1892	15,170	2,901	1,287	19,750	147	19.0	8.4
1893	14,901	2,921	1,332	20,296	144	19.6	8.9
1894	13,699	2,812	1,099	20,345	138	20.5	8.0
1895	14,546	3,014	1,151	19,931	151	20.7	7.8
1896	15,025	3,219	1,506	21,324	151	21.4	10.0
1897	13,915	2,734	1,196	20,580	135	19.6	8.5
1898	14,170	2,935	1,159	21,023	140	20.7	8.1
1899	14,381	2,823	970	20,855	135	19.6	6.7
1900	16,368	3,521	1,294	20,560	170	21.5	7.8
1901	14,856	2,805	1,063	20,294	138	18.8	7.1
1902	14,386	2,864	1,139	21,216	135	19.9	7.9
1903	15,490	2,972	1,275	21,751	137	19.1	8.2
1904	15,711	3,033	1,000	22,864	134	19.3	6.3
1905	16,298	3,159	1,076	23,271	136	18.7	6.6
1906	16,766	3,455	1,243	24,641	140	20.6	7.4
1907	17,490	3,433	1,192	25,945	132	19.6	6.8
1908	16,000	3,251	1,038	26,694	122	20.3	6.5
1909	16,484	3,365	1,128	26,431	127	20.4	6.8
1910	17,500	3,472	1,234	27,314	127	19.8	7.0
1911	17,554	3,247	1,204	28,176	115	18.5	6.8
1192	17,275	3,278	1,134	28,948	114	18.9	6.5

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CHART VIII.—SHOWING THE DEATHS AMONG CHILDREN UNDER ONE YEAR OF AGE PER 10,000 OF POPULATION FOR 24 YEARS.

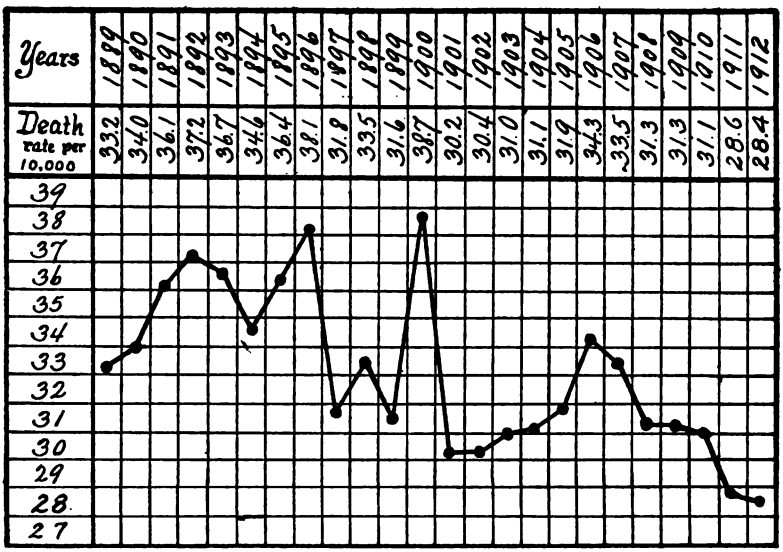
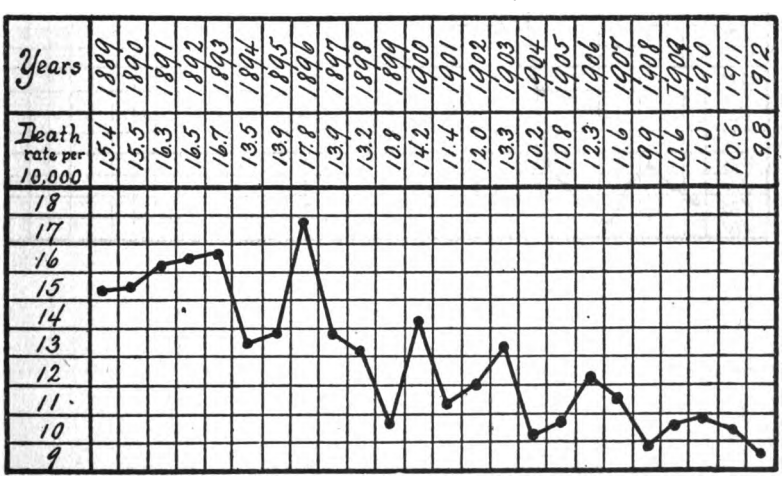


CHART IX.—SHOWING THE DEATHS AMONG CHILDREN FROM ONE TO FIVE YEARS OF AGE FOR 24 YEARS, 1889-1912.



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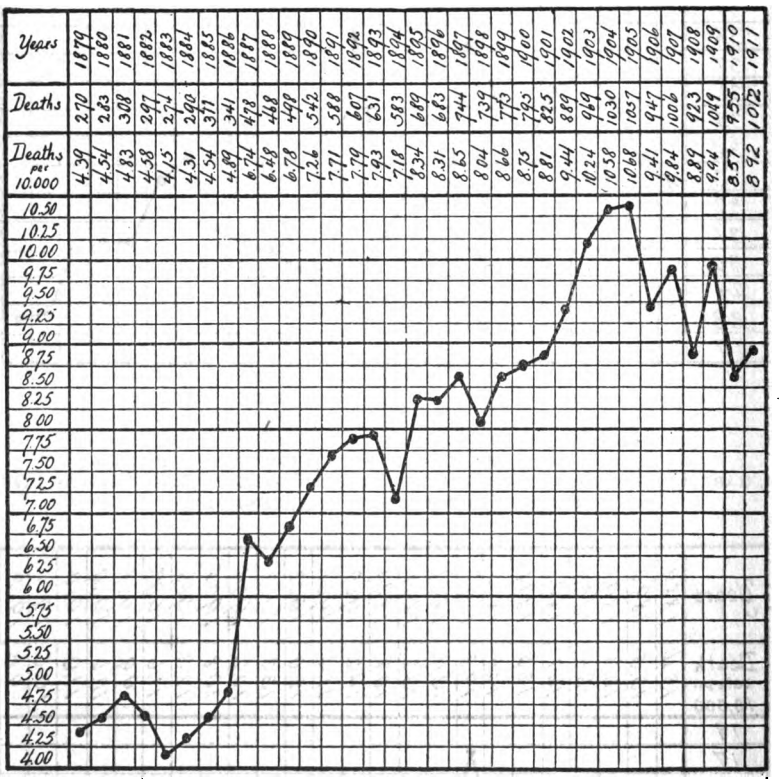
CEREBRAL HEMORRHAGE.

Cerebral hemorrhage, or apoplexy, was the cause of 1,012 deaths in 1911. More than ninety per cent. of these occurred after the age of fifty, the maximum period being from 70 to 80. Chart X. shows the death rates for the past thirty-three years.

CHART X.—SHOWING DEATHS IN CONNECTICUT FROM CEREBRAL HEMORRHAGE PER 10,000 POPULATION FOR 33 YEARS, 1879-1911 INCLUSIVE.



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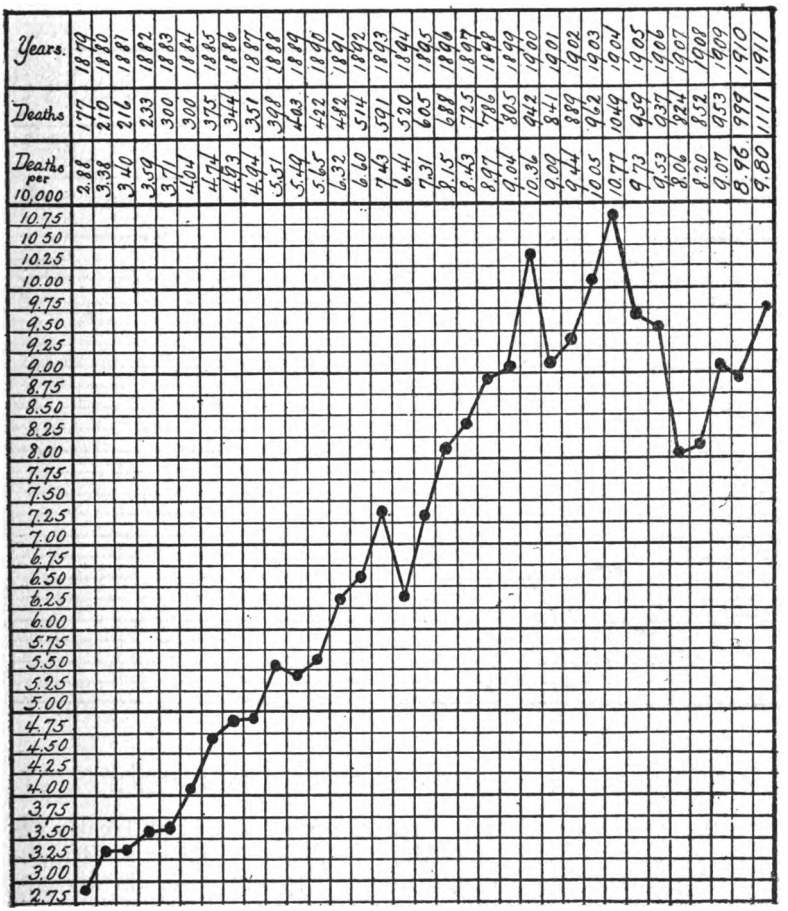
BRIGHT'S DISEASE.

Bright's disease, like cerebral hemorrhage, organic disease of heart, and cancer occurs almost entirely in the later periods of life. Chart XI. shows the number of deaths and the death rates for thirty-three years (1879-1911).

CHART XI.—SHOWING DEATHS IN CONNECTICUT FROM BRIGHT'S DISEASE PER 10,000 POPULATION FOR 33 YEARS, 1879-1911 INCLUSIVE.



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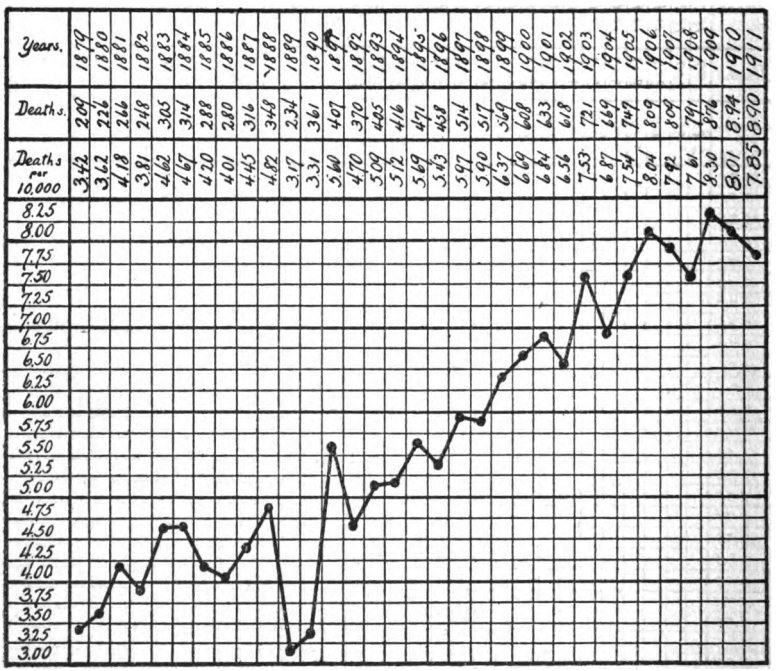
CANCER.

The number of deaths from cancer for the calendar year 1911 was 890, and the death rate 7.85 per 10,000 population. Chart XII. shows the gradual increase in the deaths from this disease for the past thirty-three years, although there has been a slight decrease since 1909.

CHART XII.—SHOWING DEATHS IN CONNECTICUT FROM CANCER PER 10,000 POPULATION FOR 33 YEARS 1879-1911 INCLUSIVE.



AN OUTBREAK OF TYPHOID FEVER IN BRIDGEPORT.

In the latter part of May, 1912, the State Board of Health received notice from Dr. E. A. McLellan, Health Officer of Bridgeport, that there was an outbreak of typhoid fever in his city which he believed to be due to the eating of raw clams.

There have been a number of typhoid epidemics traced to the eating of raw oysters, but so far as the writer knows, none have been reported as due to the eating of clams. Therefore, an investigation was at once begun, in which I was assisted by Mr.

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George C. Ham, Inspector of the Board, and Mr. James A. Newlands, Chemist.

Bridgeport had been remarkably free from typhoid for several months, one case having been reported the preceding January, none in February or March, and one case in April. In May there was a sudden increase, eleven cases of typhoid being reported between the 8th and 17th day of the month. It was found that four of the fever patients had on April 12th attended a luncheon given by a girls' society of the local high school, at which twenty-three young ladies were present. A caterer was employed and among the articles of food served were raw clams on the half shell of the variety known as little necks. The four who were ill had all partaken of these clams and came down with typhoid about the first of May. On the evening following the society banquet there was a small dinner party of seven or eight persons at a private house where raw clams were also served and three of the guests at this dinner who had eaten the clams became ill. Another victim was a young lady who on April 15th at the home of a relative had eaten heartily of raw clams, of which she was very fond, and which had been especially provided for her. She became ill early in May. Of the remaining three cases, one was a man who gave a history of eating either raw clams or oysters, he could not remember which, at a local hotel; another case was that of a traveling man, who had recently returned from the South, and no doubt contracted the fever there; and in the remaining case the diagnosis was very questionable, and it is probable that it was not typhoid fever.

In considering the articles of food eaten at these two dinner parties that might have been the means of conveying the infection, the water, milk, ice, ice cream and fresh vegetables were all inquired into, and raw clams were the only articles of food or drink consumed by all the fever patients attending these banquets that were not used by very many other people in the city. On account of the season the fly question did not have to be considered. It was learned that the clams served at both dinners were purchased at the same market and came from clam beds located in Bridgeport Harbor. This harbor or bay, to which the city is contiguous, is quite shallow in some portions, and the outlet to Long Island Sound is protected by a breakwater which interferes with the free flow of the tides. It receives the raw sewage of the city which contains a population slightly in excess of 100,000 people, and the percentage of stream water coming into the harbor is not sufficient for effective flushing, which results in an accumulation of sewage moved mainly by the tides. The clam beds are located on the east side of the harbor, inside the breakwater and near what is known as Seabreeze Island. Mr. Newlands made a bacteriological examination of the water on

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these clam beds and of several clams taken from them. The water showed sewage contamination and B. Coli were found in a portion of the clams examined, showing that they also were contaminated.

The evidence, then, so far as could be found, points to the clams as the source of the infection and the local Health Officer and myself are satisfied that they were the cause of the outbreak.

CONCERNING THE USE OF TOWELS IN HOTELS AND PUBLIC LAVATORIES.

Following the passage of this Act by the Legislature of 1911, we were in receipt of numerous inquiries regarding its application; therefore, a request was made of the Attorney-General for an interpretation of the act and his reply is here given:

HARTFORD, CONN., January 13th, 1912.

Dr. J. H. Townsend, Secretary of State Board of Health:

DEAR SIR:—In your favor of recent date you say:

"I have frequent inquiries regarding the interpretation of Chapter 95 of the Public Acts of 1911 concerning the use of towels in hotels and public lavatories, and what is included in the term 'public lavatories.' These inquiries come from school officials, manufacturers, merchants, those in charge of public institutions, and many others. While the health officials are not charged with the enforcement of this Act, it would be a great help to us in answering inquiries if you would give me a ruling on the intent of the Act."

The act to which you refer and ask me to interpret reads as follows:

"SECTION 1. All towels provided by any hotel, for the use of guests therein, or by any public lavatory shall be individual towels and when used and discarded by the individual shall not be used again until thoroughly washed and dried. Each guest occupying a room in any hotel shall be furnished with such towels in such room, and in the public wash room, if any, in such hotel there shall be kept at all times, in sight and easy of access to guests, a sufficient supply of individual towels.

SEC. 2. The owner, manager, agent, or person in charge of any hotel or public lavatory who shall fail to comply with any of the provisions of this act shall be fined not less than ten dollars nor more than one hundred dollars for each offense."

Said statute is penal in character, therefore, it should be construed according to the rule which has long been established, that penal statutes must be construed strictly.

No act should be held to be in violation of it which does not fall within its spirit and the fair import of its language. This

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rule protects any man accused from being adjudged a criminal by implication, and limits the discretion of the judge to the literal construction of the language used by the legislature. For instance, it has been adjudged, that an act made to punish the person who stole a cow, is not applicable to him who steals a heifer.

Daggett v. State, 4 Conn., 60, 63;
State v. Brown, 16 Conn., 54, 57;
Morin v. Newbury, 79 Conn., 338, 340.

The law provides that individual towels shall be used by hotels, for guests, and by public lavatories, under the penalty of not less than ten dollars nor more than one hundred dollars for each offense. This cannot be extended by construction to include other lavatories. If the legislature had intended to include manufactories and mercantile establishments, it would have said so.

I will now define the meaning of the words "public lavatory," as used in the statute. Section 1 of the General Statutes provides that "in the construction of all statutes of this state, words and phrases shall be construed according to the commonly approved usage of the language." Applying this rule, we may say there are no two opinions as to the meaning of the word "lavatory," but the meaning of the adjective "public" is necessarily varied to express the legislative intent in different statutes. Webster says that in general "public" expresses something common to mankind at large, to a nation, state, city or town, and is opposed to "private," which denotes that which belongs to an individual, or a family, to a company, or to a corporation.

Chamberlain v. City of Burlington, 19 Iowa, 395, 402.

It is clear that the term "public," as applied to "lavatory" is not an absolute, but a relative term, and is used in contradistinction to the term "private." Therefore, I am of the opinion that a "public lavatory" is a lavatory that the public has a right to use.

State v. Welch, 88 Ind., 308, 310
State v. Sowers, 52 Ind., 311, 312;
State v. Waggoner, 52 Ind., 481;
Cahoon v. Coe, 57 N. H., 556, 595.

It must be clear from what I have said that the statute in question does not apply to manufactories, mercantile establishments, schools, colleges and other public institutions, such as hospitals.

Respectfully submitted,

JOHN H. LIGHT, *Attorney-General.*

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THE SIXTH SANITARY CONFERENCE.

The Sixth Sanitary Conference of the Health Officials of Connecticut was held under the auspices of the State Board of Health, at the Hunt Memorial Building, Hartford, on April 3, 1912. It was well attended and proved of value to those present. The proceedings of the conference have been published and distributed, so that it is unnecessary to go into details of what was done. There is a limited supply of these proceedings still remaining which can be had on application. The program presented was as follows:

FIRST SESSION.

10 A. M.

Introductory Remarks by the Chairman.
The Protection of Public Water Supplies,
Mr. James A. Newlands, Chemist, State Board of Health
Discussion.
The House Fly and Its Relation to Typhoid Fever,
Dr. W. E. Britton, State Entomologist
Discussion.
Disinfection after Tuberculosis,
Dr. Charles P. Botsford, City Health Officer of Hartford
Discussion.
Co-operation between Health Officers and Commissioner on Domestic Animals for the Suppression of Glanders and Rabies.
Commissioner H. O. Averill and Prof. H. W. Conn, State Bacteriologist.
Discussion.

SECOND SESSION.

2 P. M.

THE MEDICAL INSPECTION OF SCHOOLS.

From the Standpoint of the City School Inspector,
Dr. Edward W. Goodenough, Waterbury
From the Standpoint of the School Superintendent,
Mr. Alfred B. Morrill, Wallingford
From the Standpoint of the Town Health Officer,
Dr. George F. Lewis, Collinsville
From the Standpoint of the Physician,,
Dr. Kate C. Mead, Middletown
Discussion.
Miscellaneous Business.
Adjournment.

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THE REGISTRATION OF PRACTITIONERS.

During the year 1911 one hundred and thirty-one candidates were examined by the several examining Boards to determine their qualifications for the general practice of medicine and for the practice of midwifery, while in 1912 there were one hundred and sixteen examined, making a total of two hundred and forty-seven examined during the two years. In addition, the Eclectic Board has in six instances, and the Homeopathic Board in three instances, accepted the licenses to practice granted by other states, in lieu of examination. Of the candidates examined, two hundred and nineteen were examined by the Board representing the Connecticut Medical Society, seven by the Homeopathic Board and twenty-one by the Eclectic Examining Board.

Twelve of the physicians examined and found qualified have neglected to register with the State Board of Health and receive their licenses. They are, therefore, not legally entitled to practice in the State.

The following is a tabulated statement of the work of each Examining Board:

EXAMINATIONS BY EXAMINING BOARDS REPRESENTING THE THREE STATE MEDICAL SOCIETIES.

Medical Examining Boards.		Passed.		Failed.		Accepted Examinations of other states.	Total
		General practice	Midwifery	General practice	Midwifery		
Connecticut,	1911	71	14	27	7	9	119
	1912	64	8	21	7	0	100
Homeopathic,	1911	2	0	0	0	3	5
	1912	5	0	0	0	0	5
Eclectic,	1911	0	9		1	3	13
	1912	1	9	1		3	14
Total,		143	40	49	15	9	256

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THE LICENSING OF EMBALMERS.

Under the provisions of the law of 1903, providing for the licensing of embalmers, the State Board of Examiners of Embalmers have held four regular examinations each year. These examinations were held at the Yale Medical School in New Haven, and the Secretary of the State Board of Health has usually been present, taking part in the examinations, as the law provides. The examinations are written with oral demonstrations on the cadaver and serve well to test the ability of the applicant to perform the duties of an embalmer.

During the year 1911 twenty-nine candidates were examined; fifteen passed and fourteen failed. During the year 1912 twenty-six were examined; twenty passed and six failed. There are at present 466 licensed embalmers in the State.

The relation between the embalmers and health authorities of the State is important from a sanitary standpoint, and on their continued co-operation depends the successful development of the business of embalming and the observance of the rules of sanitation in the care of the dead.

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SPECIAL REPORTS AND ADVICE TO OFFICIALS AND INDIVIDUALS

Questions regarding a great variety of health matters are continually coming to this Board. A great many letters are written in reply and many personal inspections are made by committees of the Board or its employees. A few letters and reports are printed here as samples of this work. Some also relate to topics of public interest and may serve to answer questions that present themselves to others.

SEWAGE DISPOSAL AT WINSTED.

April 8, 1911.

WILLIAM H. BLODGETT, ESQ., *Attorney for the Borough of Winsted, Winsted, Conn.*

MY DEAR SIR:—This Board has received from the Borough authorities of Winsted detailed plans showing a system of sewerage which the Borough contemplates establishing. These plans are embraced in five or more blue prints, sheets and profiles. The submission to the Board was verbal, but as the Board understands it, the Borough desires the Board to either approve or disapprove the plans in question. The authority of the Board under the statutes is quite limited, and the Board does not consider that any approval or disapproval which it might make upon the plans submitted would be considered as authentic or as in any way binding upon the Borough of Winsted. The statutes provide as follows: "Section 2506: Said Board shall, when requested by public authorities, advise officers of the State, County or local government in regard to sanitary drainage and the location, drainage, ventilation and sanitary provisions of any public institution, public building or public place."

The Board has been called upon several times to advise with managers of public institutions and municipalities as to the methods of sewer disposal. This is the first time that any municipality has submitted detailed plans to the Board asking for its approval or disapproval of such plans. This Board is without authority to require any municipality to establish a sewer system and has no authority to supervise or to see that any proposed sewer system is in fact constructed in accordance with the plans that might be submitted, or supervise or enforce proper care of the sewer system after the same has been constructed.

We commend the efforts of Winsted in the establishment of a sewer system, which, we believe, is very sadly needed, and should consider that the establishment of the system upon the general line as shown upon the blue prints would result in a very material improvement in the situation. We should not recommend in any case that surface or storm water should be allowed to pass into the sewerage pipes under any sys-

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tem which Winsted might adopt. And we should be disposed to look upon the Imhoff tank as distinguished from the septic tank as somewhat experimental and necessarily somewhat more expensive to establish. But we do not wish to be understood as either approving or disapproving the plans in this regard as shown by the blue prints. That is a matter which the Borough of Winsted will have to decide for itself, as this Board is without authoritative power to decide it.

At a hearing before the Board Mr. Wellington B. Smith appeared as counsel for some clients who were riparian owners below the Town of Winsted, and who were interested in a pond from which ice had been harvested for domestic purposes; that said pond had been condemned as an ice pond by reason of the contamination of sewage coming down the river from above, and while disclaiming any intent to influence the Board in respect to any particular form of sewer system which they might recommend, claimed that any system which the Board might recommend should be such as to prevent sewage contamination of the ice supply below so that the proprietors could thereafter harvest and use said ice for domestic purposes.

This Board does not consider that it has any power to enforce the adoption of any sewerage system for any municipality or to recommend any system in detail which would guarantee to riparian proprietors below such a system of sewerage that it would be safe thereafter to use said waters or the ice gathered from said waters for domestic supply. If waters are contaminated by a municipality or by any individual in discharging filth into a stream, the riparian owner below who can show a damage has a right to appeal to the Courts.

The Board is of the opinion that the establishment of the system as detailed in the plans under consideration would probably give a stable non-putrescent effluent. In other words, that it would remove the solid matter from the sewage and would give an effluent which was not offensive to the sight or smell. It is well known, however, that an effluent of this description would not necessarily be bacteriologically pure, or in other words that it might carry disease germs to such an extent as to render the waters below in a stream dangerous for domestic use either as water or as ice. By several adjudicated cases our Supreme Court has required the municipalities to so dispose of the sewage as not to create a nuisance to the riparian owners below, and up to this time municipalities have not been required to go further than to remove the solid matter from the sewage and discharge into the stream below a stable non-putrescent effluent.

A desire of the Borough of Winsted to procure the authority and approval of the plans in question, or some other plan by the State Board of Health, coupled with the notice given to the Board by riparian proprietors below, that whatever plan the Board of Health should recommend, would be considered by them as a removal of the present inhibition of the ice supply, leads this Board to the conclusion that possibly the Borough of Winsted is desirous of protecting itself against future litigation, and the riparian proprietors below are anxious to make their ice supply available for domestic use, all of which both parties seem to think might be accomplished by securing the approval of these plans by the Board of Health. This Board does not feel justified in taking any action which the Borough of Winsted might afterward claim absolved them from the possibility of future litigation, or which the riparian proprietors below might claim rendered their ice available for domestic supply. If the Borough of Winsted, or other boroughs, or individuals, pollute the stream above the ice ponds, the question of damage, if such exists, is one peculiarly within the jurisdiction of the Courts. If the ice supply is, in fact, contaminated so as to make it unfit for domestic use,

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the Health Officers in the localities where such ice is offered for sale have power to take such measures as they deem advisable to prohibit the sale of the ice.

In view of the fact that modern methods of sewage purification may succeed in getting a non-putrescent effluent from which solid matter is removed and not offensive to the smell, but which may, nevertheless, carry disease germs to such an extent as to render the waters in the stream below dangerous for domestic purposes either as water or ice, and, in view of the fact that no standard of purity of sewerage effluent has been established either by adjudication of the Courts of this State or by statute, this Board must decline to either approve or disapprove the specific plans submitted.

WHOOPING COUGH.

April 8, 1911.

MR. E. W. BULL, *Health Officer,*
Kent, Conn.

DEAR SIR:—I received complaint by telephone that there are a number of cases of whooping cough in the town of Kent, and that the children are allowed to run about the streets, visiting the post office and other public places.

Whooping cough is a disease which, according to the town regulations, must be reported to the Health Officer, the children excluded from school, and subjected to such quarantine or isolation as the Health Officer may direct. Absolute quarantine cannot be maintained, in these cases, nor is it necessary, but the child can have a great deal of liberty in its own yard and on retired streets, but should be kept away from all public places and assemblies. If the child is unwilling to exercise proper care as you direct then he should be compelled to submit to complete isolation at home.

SCHOOL HOUSE AT EAST HAMPTON.

May 5, 1911.

MR. S. H. CLARK,
East Hampton, Conn.

DEAR SIR:—I am in receipt of the petition to the State Board of Health signed by yourself and some twenty residents of East Hampton, complaining of the school accommodations furnished some of the children. I have taken this matter up with Mr. Hine, Secretary of the State Board of Education, and have seen the report of his inspector who visited the school. It seems that this room over the grocery store is used temporarily, owing to the crowded accommodations at the regular school building, and that this is the only available place that can be used. I understand that the necessity for a new school building in East Hampton is recognized, and it would seem to me that the petitioners should devote all their energies and use their influence with the town to secure a new school building. This, both Mr. Hine and myself think, is the solution of the matter. The conditions you describe are wrong and the place is evidently unsuited for the purpose, but this Board has no authority to compel the town of Chatham or the school district to build a new schoolhouse. Your petitioners can do much more to accomplish such a result than the State Board of Health.

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MOSQUITO EXTERMINATION.

May 12, 1911.

DR. F. W. HUGHES, *Health Officer,*
Groton, Conn.

MY DEAR DOCTOR:—Replying to your letter of the 8th inst., I would say that petroleum is used to destroy the mosquito wigglers soon after they are hatched and before they develop into mosquitoes. This is done by adding enough petroleum to the body of water where they are breeding to form a thin scum on the surface, this to be repeated once in two or three weeks. The time to commence is now or as soon as the mosquitoes begin to breed. This treatment is intended for places which cannot be drained or filled in or where fish cannot be used to feed on the mosquito larvæ. You can secure full information on this subject in a book by Dr. L. O. Howard, Entomologist of the Bureau of Animal Industry, Washington, D. C. This book is published by McClure, Phillips & Co., New York City. You might possibly by writing to the Bureau of Animal Industry at Washington secure some bulletins on this subject free of charge.

WASTE DISPOSAL, SHENIPSIT LAKE.

May 29, 1911.

HON. CHARLES PHELPS,
Rockville, Conn.

DEAR SIR:—Following my interview with you on May 23rd, Mr. Newlands and myself in company with Mr. S————, visited his summer cottage now under construction on the north shore of Shenipsit Lake.

After considering this matter it appears to us that the water company cannot reasonably expect the State Board of Health to make rules and regulations for the diposal of wastes from Mr. S————'s cottage unless such rules and regulations are to apply equally to the other cottages along the shore or on tributary streams. The custom of building summer cottages on the shores of a lake used for drinking purposes cannot be approved, and this fact was called to the attention of the water company in our report on the Rockville water supply published in the report for 1907-1908 (see page 213). As Mr. S————'s cottage is only one of about eighteen around the lake shore we would suggest the following set of rules and regulations governing the disposal of wastes at these places as a means of reducing the danger of contamination of the water, although the company should be advised that this is to be considered only as a temporary measure and that all the availble shore land should be acquired and sources of contamination eliminated as rapidly as practicable.

1. That no cesspool, privy or other place for the deposit or storage of human excrement should be located within fifty feet of the high water mark of Shenipsit Lake, or within fifty feet of the high water mark of any streams, ponds, or water courses tributary to said lake.

2. That no cesspool, privy, or other place for the deposit or storage of human excrement should be located within two hundred and fifty feet of Shenipsit Lake or its tributaries as above mentioned unless such receptacle is so constructed that no portion of the contents can escape or be washed into the reservoir or its tributaries.

3. That no house slops, sink wastes, or other polluted water should be discharged on or into the ground within fifty feet of Shenipsit Lake or its tributaries as above mentioned, and no house slops, sink wastes, or

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other polluted water should be thrown on the ground within two hundred and fifty feet of such waters.

4. That no stable, pig pen, chicken house, or other structure where the excrement of animals or fowls is allowed to accumulate, should be located within fifty feet of the high water mark of Shenipsit Lake or its tributaries as above mentioned, and no structures of this character should be located within two hundred and fifty feet of the high water mark of such waters unless provision is made for preventing manure or other polluting material from flowing or being washed into such waters.

Briefly, these rules provide that no structure of any sort, where objectionable material is deposited or kept, shall be located within fifty feet of high water mark, under any consideration; that between the fifty and the two hundred and fifty foot lines no wastes shall be thrown on the ground and human excrement must be kept in watertight receptacles, while other waste must be kept in receptacles and these not allowed to overflow although they need not be watertight.

Such rules would allow Mr. S———— to construct his sink waste cesspool at the point he proposed between the cottage and the road, but regarding the privy which you wished us to consider we find that he proposes to build an additional vault for his own use adjoining the ones now used by Mr. Keeney. This would be within fifty feet of the high water mark of the Lake and it should go farther back from the shore than he plans, and would have to have, of course, a watertight vault.

I have not written Mr .S———— but will leave it to you to notify him, if this report meets with your approval.

CAMP SANITATION.

June 16, 1911.

MR. ARNOLD M. LEHMAN, *General Delivery, Winsted, Conn.*

DEAR SIR:—I am in receipt of your letter of the 10th inst, and have considered the matter of waste disposal at your Winsted Camp. I assume that this Camp is located on the southern shore of Highland Lake near Winsted and is to be a temporary one. As there is no running water available I would suggest either of the following methods which will give satisfactory results.

First—Some approved type of incinerator could be bought and placed in any convenient and inconspicuous location. Types of these incinerators are the McCall incinerator and those manufactured by the United States Incinerator Co.

Second—In case the expense of incinerators is too great, the pail system could be used. This system requires watertight (usually metal) pails of ample capacity placed under the closet seats and a supply of fresh ashes or earth kept on hand to absorb the liquids and act as a deodorizing agent. The fittings betwen the top of pail and the bottom of the closet seats should be as tight as possible and the pail chamber underneath should be enclosed and fitted with a door so that the pail may be removed from the back of the closet. Pails should be removed at frequent intervals, the contents carefully buried, and the pails thoroughly cleansed. and disinfected before they are replaced. The closets should have continual ventilation. Possibly three seats would be required for the camp suggested.

This system has given satisfactory results, and in some places quite large communities are served in this way. In case running water is to

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be used a septic tank followed by sub-surface treatment might be installed, but it would be necessary to make an inspection of the ground before details could be worked out.

SCHOOL HOUSE AT CHESHIRE.

July 12, 1911.

MR. C. E. HOADLEY, *County Health Officer,*
New Haven, Conn.

DEAR SIR:—In compliance with your request that I make an inspection of the school house at Cheshire Center with reference to its fitness for the purpose, on June 23, 1911, I visited the school house and respectfully submit the following report:

The building was not built for school purposes but was formerly a family residence and was converted into a school house with very little change. It is old and very much dilapidated and there are places where large patches of plaster have fallen from the walls. The floors are badly worn and in one room there is a hole broken through the flooring into which one's foot could readily pass. The ceilings are all low, one room on the second floor being only eight feet high. This gives an inadequate amount of air space in a school room filled with children. There are three school rooms in this building and the air space varies from 140 to 215 cubic feet per pupil with an attendance of about three-fourths of the seating capacity; with attendance increased to equal seating capacity this would be much less. In Massachusetts it is required in school construction that each pupil be supplied with 1,800 cubic feet of pure air per hour. If the ventilation is such that the air can be changed six times per hour this would necessitate an air space of 300 cubic feet per pupil, and with good ventilation it is sometimes less. In this building there is no possible way of securing proper ventilation, especially in winter, and the air must become very foul or the children exposed to draughts from open windows.

It is my opinion that this school house is unfit for the purpose and in a condition dangerous to the health of the children in attendance.

GROTON WATER SUPPLY.

August 29, 1911.

DR. F. W. HEWES, *Health Officer,*
Groton, Conn.

DEAR SIR:—Enclosed please find report on the sample of water submitted from the Groton supply:

The results are more satisfactory than those obtained from the previous sample, both in appearance and in the quality of the water, and there is no evidence of the presence of dangerous contamination at this time.

Regarding the possibility of dangerous contamination reaching the supply from the Irving, Budington and Chase places which I visited with you on August 22, would say that the watertight vaults at the Irving and Chase places come within the usual requirements of state health boards, as they are tight and are located more than fifty feet from the high water mark of the reservoir. The privy at the Budington place is not suplied with a watertight vault, and contamination of the pond might occur here during spring freshets or at the time of a heavy rain

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storm. The sink drainage from all the houses goes to cesspools about 150 feet from the pond on level ground, and there appears to be little chance for serious contamination from these sources.

While the privies at the Chase and Irving places are built in accordance with the usual requirements for such outbuildings, and that at the Budington place can be made satisfactory, I believe that all land within 250 feet of a reservoir should be owned or controlled by the water department in order that regulations for the protection of the supply may be enforced. Property holders living close to a water supply can be required to observe certain regulations for the protection of the supply, but constant observation of sanitary conditions about such places is necessary, especially when there is antagonism between the property holder and the water department. The use of land immediately adjoining the reservoir for gardening purposes is detrimental to the safety of the supply, especially when animal or human wastes are used for fertilizing, but the courts would very likely decide that an owner has a right to any reasonable use of his own land and this use could be stopped only by purchasing the land.

There appeared to be no serious contamination of the pond from these sources at the time of our visit and it is probable that the finding of colon bacilli in previous samples is due to drainage at times from some other source or sources, or to more or less harmless pasture drainare. This can be determined more definitely by an inspection of the entire drainage area which will be made in the near future.

A case for sample of the lake water has been shipped and a report on this will be sent as promptly as possible.

WILLIMANTIC WATER SUPPLY.

August 25, 191.

W. P. S. KEATING, M. D., *City Health Officer, Willimantic, Conn.*

DEAR SIR:—I have your letter under date of August 21, in which you state that on looking over my reports on your city water supply you find in the reports for July and August "negative as far as nitrogen as nitrates, and very lttle if any free and albuminoid ammonia, the chlorine report is normal for the section," and yet in my conclusions I have stated that the "water shows the presence of sewage contamination, also the presence of the Colon bacillus or of the Colon type." You also say, "I can't quite understand how we can have sewage contamination without the presence of a large amount of chlorine or of the nitrates or ammonia; we have not had a case of typhoid fever in the city for a long time, and the only case reported does not use city water."

I will try to answer your questions in the order in which they have been raised. Regarding the figures for nitrates and ammonia I would say that in the case of a surface water these figures are not usually high unless there is quite a large volume of pollution present. This is due to the fact that these ingredients form an important part of the food supply of vegetable and animal life which develops in surface waters and unless the pollution is excessive the ammonia and other nitrogen compounds are rapidly eliminated. The excess of chlorine over the normal will vary, of course, with the relative volume of pollution and pure water and when the dilution is quite high the difference may not be great enough to warrant condemning a supply on that data alone. To illustrate these points I quote from an examination of Connecticut River

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water made in August, 1909, the sample collected near the Highland Div. R. R. bridge:

Free Ammonia	.030
Albuminoid Ammonia	.126
Nitrates	.15
Chlorine	3.16

These results are only a very little higher than the results obtained from the Willimantic supply and yet the sewage of Springfield, Mass., and a number of other towns is discharged into this stream. The chlorine, when the above sample was taken, was about 1.36 above the normal for that region and at certain times might be nearer the normal. The sample from your supply taken this month showed a chlorine of 2.7 or .6 above the normal, but the January sample showed a chlorine of 4.22 or 2.12 above the normal. I have given you this comparison to show that in the case of surface waters the chemical results, while of some value in showing contamination, are not delicate enough to form a basis for an opinion upon a water containing relatively small amounts of sewage pollution. In such a case the bacteriological results and a knowledge of conditions on the drainage area are of much more importance and my opinion on your supply is based upon these data.

I admit that I made the statement that the water shows the presence of sewage contamination and also that bacteria of the Colon type were found, but the order of these statements was reversed. I said that bacteria of the Colon type were found to the extent of about six per cubic centimeter and, basing my opinion upon this result and a knowledge of some conditions on the drainage area, I stated in the following paragraph that the water showed definite evidence of drainage contamination.

The presence of the Colon bacillus in water indicates the presence of either sewage or animal pollution, and at intervals very good supplies, where there are some pasture lands, will show small numbers of Colon bacilli, say in five to ten cubic centimeters of water. These come from pasture drainage and have no great sanitary significance. But the presence of these organisms to the extent of six per cubic centimeter could hardly be passed as being due to harmless pasture, drainage, especially when sewage contamination of the stream is so evident as it is at some of the mills along the shores above the intake. This stream above the supply intake has a drainage area of about 162 square miles, and a population of considerably over 6,000, and several mills along the shores. If the water first went to a very large reservoir where long storage allowed the action of sunlight, sedimentation, and other bactericidal influences to eliminte contamination of dangerous character no further purification would be necessary. The use of a running stream from an inhabited drainage area, however, where the interval between the time of contamination and public use is too short for the elimination of dangerous conditions represents a constant menace to the health of the city. You say that there has been no typhoid fever in the city for a long time. It must be borne in mind that the presence of sewage contamination and the Colon bacillus does not necessarily indicate the presence of typhoid germs. It simply indicates the possibility of typhoid germs reaching the supply and it is necessary for some one on the drainage area to have the disease before the supply can be infected. Considering the costly lessons which have been learned from the typhoid epidemics at Ithaca, N. Y., Plymouth and Pittsburg, Pa., and numerous other places throughout the country, it is highly improbable that Willimantic would escape a serious epidemic if typhoid fever broke out among the operatives at any of the factories along the course of the stream where there is direct contamination of the water from overhanging privies. Freedom from ty-

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phoid fever must be considered as being due to fortunate circumstances, rather than the purity of the supply, and the continued use of this supply without purification is a continued risk of the public health.

I have gone into detail in replying to your letter because I believe the situation requires prompt attention and that steps should be taken to improve this supply.

COPPER SULPHATE FOR ALGAE GROWTHS.

September 14, 1911.

MR. L. W. WHITTLESEY, *Health Officer, Morris, Conn.*

DEAR SIR:—In accordance with the plan suggested in my recent letter I visited Bantam Lake on September 8 where I met your son, Mr. J. M. Whittlesey, Mr. Brown of the Berkshire Ice Company, and representatives of the Bantam Lake Association, to talk over the proposed plan of treating the lake with copper sulphate.

As the situation was explained to me it appears that the ice supply during the past winter was badly discolored by heavy growths of algae and that during the present summer the lake has developed unusual growths which have produced conditions very unsatisfactory to the summer residents. The ice company and the Bantam Lake Association plan to co-operate in an effort to improve these conditions and the representatives were under the impression that immediate treatment of the lake with copper sulphate would avoid a recurrence of damage to the ice and insure freedom from trouble during warm weather for the next year or two. They wished to be advised, however, regarding the danger to fish life and other possible effects of such treatment before proceeding. Before considering in detaill the results which might be expected from such treatment I believe it would be well to explain briefly the problems involved.

A sample of the ice harvested last winter and two samples of water collected on September 8 were sent to the laboratory for microscopic examination. No data could be obtained from the ice sample as the algae imbedded in the ice had become disintegrated during storage. The water samples showed the following micro-organisms:

Anabaena	Very large numbers
Cœlosphaerium	" " "
Euglena	Moderately " "
Melosira	Small "
Synedra	" "
Cœlastrum	" "
Cosmarium	" "
Ceratium	" "
Brachionus	" "
Anurea Cochlearis	" "

The above list of organisms represents only a very small number of the types of algae and protozoa which appear and disappear with the changing seasons just as do the spring, summer and autumn flowers and plants on land. Many of these microscopic water plants never appear in sufficient numbers to be noticeable without the aid of a microscope, while others under favorable conditions of sunlight, temperature, and food material develop to such an extent as to produce the conditions you have at present. It is an error to assume, however, that the types of plants producing the present trouble were the cause of the damage done to the ice

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last winter. In fact, Anabaena and Cœlosphaerium, the present offenders, rarely grow in appreciable numbers when the temperature of the water is below 70 degrees F. A form called Aphanizomenon discolored the ice on a lake in New Hampshire a few years ago and one or two other types sometimes develop in large numbers during cold weather, but the ice in this case has probably been in storage too long to show the cause of last year's trouble.

It may be well to state here that the chance for a repetition of last winter's trouble is very remote. The discoloration of ice by algae is an extremely rare occurrence and was probably due in this case to the unually dry season, low water, and other conditions favorable for heavy growths, a combination of circumstances which will probably not be repeated for a long time to come. If the ice company wish to guard against further trouble this winter, however, it would be much better to allow the present growth of warm weather algae to die out by natural means and defer treatment until later in the fall when a few examinations of the water will show whether the use of copper sulphate is going to be necessary, and when the prospect for successful treatment will be much better than it is now.

In any case copper sulphate treatment either now or later in the fall will not insure freedom from trouble for one or two years as seems to be the impression among those interested in the matter. The length of time through which such treatment is effective depends very largely upon local conditions. In some cases shallow reservoirs with other favorable conditions require at least two applications per year. With Bantam Lake the period of improvement after treatment can be determined only by experiment. Careful treatment during the latter part of May or early in June, when summer growths are beginning to appear in appreciable numbers, would probably put the water in good conditions for the summer, but there is no reason to believe that treatment this fall would have any direct effect on warm weather growths which might be carried into the lake next spring by tributary streams.

Regarding the effect of copper sulphate treatment on fish life I would say that in the majority of instances careful application of the proper amount of chemical does not seriously affect the fish, but once in a while considerable numbers are killed. This seems to be especially true when the algae growth has been allowed to become very heavy before the treatment is made.

The amount of copper sulphate necessary for effective treatment will, of course, depend upon the type of algae causing the trouble, some offenders requiring as much as two lbs. per million gallons. One and one-eighth lbs. per million gallons of water has been advised for Anabaena and Cœlosphaerium by the United States Government officials and this should give satisfactory results under existing conditions if treatment is decided upon. With this amount, estimating he capacty of the lake as 7,500 million gallons about 8,437 lbs. of the chemical would be required.

In summing up the matter may be stated as follows:

1st. That the types of algae causing the present trouble are probably not the types which damaged the ice supply of last winter.

2nd. That the chance for a repetition of last winter's trouble is a remote one, but the prospect for successful treatment if treatment should appear to be necessary, will be better a month or two from now than at the present time.

3rd. That the length of time through which copper sulphate treatment will be effective depends very largely upon local conditions and that for the prevention of summer growths treatment during the late spring will probably be found necessary whether fall treatment is made or not.

4th. That copper sulphate treatment can usually be made without ser-

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iously affecting the fish in the supply although under certain conditions considerable numbers of fish are killed. The best results are usually obtained if the application is made before the growths have become fully developed.

PUBLIC WATER SUPPLY.

October 7, 1911.

MR. GEO. M. CROSSMAN, *Supt. Water Dept.*
Winsted, Conn.

DEAR SIR:—Replying to your letter of recent date would say that as stated in my letter of July it is impossible with our present facilities at the State Laboratory to make monthly examinations of all the water supplies in the state. Your supply among several others has been examined during the past two years and the State Board of Health thought it advisable to discontinue this list and to take up the work for a number of other places where the drainage areas had not been inspected. The purpose of this work is to determine by means of a series of examinations whether continual or intermittent drainage contamination is reaching the supply and while these examinations are of considerable value in determining the changes in the character of the supply it is much more important to inspect the drainage areas and eliminate conditions which represent a constant menace to the quality of the water.

During the past two years no monthly sample, I believe, has shown evidence of the presence of dangerous contamination, but my inspection of the drainage area showed that there are several places where serious infection of the supply is possible, and it should be understood that the elimination of these conditions on your drainage area will do more for the protection of public health than any series of analyses which, at best would show contamination, if present, at a time when a considerable amount of the water had already been used. In other words, if the protection of the public health is the end in view, it is much wiser to eliminate sources of possible infection than to wait for the water analysis to show infection as the examination requires about a week and as has been said a considerable amount of water will have been used in that time.

Two or three other city officials have asked to have the monthly examinations continued, but it was decided that the entire list should be dropped with the exception of two supplies which show contamination at intervals, and in these instances it is necessary to advise he public of the danger incurred by the use of these supplies.

If at any time you suspect your supply has been contaminated there will be no difficulty in getting an examination of the water without charge. Regarding your question about expense would say that no private work is done at the state laboratory.

If you are unable to find a copy of the report on the inspection of the drainage area you will find it published in the Biennial Report of the State Board of Health for 1909-1910, Page 191.

STREAM POLLUTION.

November 15, 1911.

MR. J. R. PARKHURST, *Health Officer,*
Stafford Springs, Conn.

DEAR SIR:—Concerning my visit to Stafford Springs on November 10th, and inspection with you and Mr. Yeomans in regard to the sanitary conditions of the village, I would offer the following suggestions:

The private sewers now emptying into Furnace Brook produce an un-

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sightly condition which must be very offensive in the hot, dry months of the year, and should not be allowed. A sewer should be built in the street which runs north and south parallel to the brook, and should empty into or join the Main street sewer near the railroad station. A sewer is also needed in the western or northwestern part of the town where a tenement house belonging to Mr. Falkner sewers into a cesspool located in the highway, which cesspool is not only badly located but is constantly overflowing, thus producing a very unsanitary condition, and one which is not permitted by law. A sewer should also be built in this neighborhood, running south, and connecting with the Main street sewer.

However, before adding any more sewers in a hap-hazard manner, I believe the borough should employ a competent engineer to lay out a sewerage system, providing not only for present needs but for future extensions, with plans for purification and disposal works somewhere on the river below the village.

DISINFECTION AFTER SCARLET FEVER.

November 28, 1911.

DR. H. G. BUEHLER, *Headmaster Hotchkiss School, Lakeville, Conn.*

DEAR SIR:—At the request of Dr. William B. Bissell, Health Officer of the Town of Salisbury, I visited Lakeville on November 25th, 1911, and with him made an inspection of the Hotchkiss School with reference to a recent outbreak of scarlet fever.

Outside the school there are no cases of the fever in the village of Lakeville, and there have been none reported for nearly a year. The school buildings are modern and in excellent sanitary condition. The first case occurred November 3rd, and between that date and November 19th fourteen cases in all were reported, the majority (11) coming down on the 18th and 19th of November. After considering all the possible sources from which the infection could come, it seems most probable that there was prior to the outbreak, either among the pupils or employees of the school, a case of scarlet fever so mild as to escape detection. Such cases are not uncommon and may have only a slight sore throat to indicate illness. The cases reported on November 18th and 19th were all undoubtedly secondary to the earlier cases.

At the onset every precaution was taken to prevent the spread of the disease, and at the appearance of the secondary cases November 18th and 19th, the school was very properly closed and the pupils sent to their homes.

You have already begun the work of disinfecting the buildings and their contents by means of formaldehyde fumigations of rooms and steam sterilization of infected articles. These are the most approved methods in use at the present time and should be effective.

Taking up the various matters about which you asked my advice, and some others that occur to me, I would recommend the following:

That the rooms occupied by scarlet fever patients be fumigated with formaldehyde gas, as you are doing, being particular to seal the rooms by pasting strips of paper over cracks of doors and windows. All surfaces should be exposed as much as possible; closet doors opened, also bureau drawers and their contents scattered about. Spread out shades and curtains to full length. Mattresses should be placed on ends, pillows, bedding and clothing suspended from lines stretched across the room or spread out on chairs,—in short the room and its contents so disposed as to secure free access of gas to all parts as fully as possible. All sheets, pillow slips, towels and other washable articles in the rooms

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should be immersed in a solution of carbolic acid, three ounces to a gallon of water, for four hours, then sent to the laundry and boiled for a half-hour. Articles of little value should be burned. Woolen blankets, clothing, and other such articles should be sterilized by steam, keeping up a steam pressure of fifteen pounds and a temperature of 250 degrees for at least twenty minutes, and then taken out of doors and thoroughly aired. After fumigation, thoroughly air the rooms, and wash the floors with 1-1000 corrosive sublimate solution, wipe woodwork and furniture with cloth dampened with disinfectant solution, brush walls and ceilings thoroughly with disinfectant and then re-paper or calcimine and re-finish woodwork. Do not neglect closets, ledges, cornices or other surfaces on which dust may settle.

For rooms not occupied by scarlet fever patients—but possibly infected—disinfect with formaldehyde, preparing room so that gas may have access to all parts of it and its contents, go over floors, wood work, especially all horizontal surfaces, with cloth wet or dampened with disinfectant (corrosive sublimate 1-1000) and thoroughly air rooms and contents.

In answer to questions contained in letter to Dr. Bissell, would say:—

(1) Articles should be kept in steam sterilizer at pressure of fifteen pounds and 250 degrees for at least twenty minutes.

(2) Twenty minutes, for if necessary to sterilize these articles at all, they should be done thoroughly.

(3) a. Books known to be infected, those in pews or desks used by the boys who have had the fever, and stray books lying around in corridors should be burned.

b. Books in school study and chapel should be fumigated with formaldehyde, placing them on end and spreading leaves apart as much as possible. Books in rooms not known to be infected I would not attempt to disinfect.

General Considerations—Direct sunlight is one of the most effective disinfectants known. The exposure of rooms, bedding, clothing, and other articles to the direct action of the sun is a valuable supplement to other measures of disinfection. Steam does not injure cotton or linen, though it may damage woolen or silk. It injures rubber, felt, leather and fur, and is not applicable to articles composed of such materials.

The quantity of formalin necessary to use in disinfecting 1,000 cubic feet of air space as estimated by different authorities varies from eight to sixteen ounces, and in some experiments made in our laboratory a few years ago we found that the more gas used the better results, and I would recommend that for 1,000 cubic feet of air space not less than twelve ounces of formalin be used. Always use more than is recommended by the manufacturer of any apparatus. This we found necessary in our experiments. Formaldehyde is not effective in a room where temperature is below 60 degrees and acts better in the presence of moisture.

The clothing in the gymnasium lockers: I would put such of it as you can through the sterilizer and the remainder I would thoroughly air in the sunlight, wiping out lockers with cloth dampened with disinfectant. When in doubt, treat articles as infected.

In purchasing a sterilizer, which you spoke of doing, I would purchase one large enough for mattresses and with attachment for formaldehyde disinfection under pressure. This will be useful for articles injured by steam.

I believe I have now covered all matters about which you asked my advice.

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DRINKING FOUNTAINS.

January 4, 1912.

MR. NEWELL JENNINGS, *Supt. Board of Education,*
Bristol, Conn.

DEAR SIR:—Your letter of the 2nd instant to the State Board of Education has been referred to us. In reply I would say that we recommend the installation of drinking fountains in every school where there is running water, and in rural schools where the water supply comes from a well, there should be provided a tank with a faucet, which tank can be kept filled with water and each child be required to furnish a drinking cup for its own use. Where the drinking fountain is used, it is very essential that the bubbler be of a type that will not allow the child to close the mouth over it, thus defeating the very object for which it is intended. There are a number of good bubblers on the market that are constructed so as to overcome this fault. If there is anything else we can tell you about this matter we shall be very glad to do so.

WHOOPING COUGH.

January 26, 1912.

DR. A. M. PURDY, *Health Officer,*
Mystic, Conn.

DEAR DOCTOR:—I have your letter of the 24th inst, regarding the care of outbreak of whooping cough, and in reply would say that as whooping cough is seldom conveyed by a third party I do not think it is necessary to keep from school those who have already had the disease, even though they come from the house where it is prevalent. The town regulations require the placarding of whooping cough, so you will have to do this and keep the children who have the disease not only from school but from public gatherings, that is, make them stay on their own premises.

POLLUTION OF ICE POND.

February 15, 1913.

MR. OSCAR PATTERSON,
Washington, Conn.

DEAR SIR:—Replying to your letter of the 14th I would say that my report, No. 165-2298, was on the water of your pond and not on an examination of the ice, but the results showed very definite evidence of contamination and until I know more about conditions surrounding the pond it would be impossible to pass upon the advisability of using ice from this pond for domestic purposes.

As you probably know, bacteria and other impurities are, to a very large extent, forced out of water during the mechanical process of freezing from the surface of the water downward. Any water which flows over a new layer of ice, however, includes all impurities on freezing and in the case of a contaminated water it is important that all ice due to flooding, rain, or snow should be cut off and blocks of ice containing visible dirt should be rejected. Ice should be harvested from deep water and away from inlets to the supply.

Whether your supply can be used with safety with the above regulations will depend upon the size of the pond, the location of drainage in-

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lets, etc., and your local Health Officer can decide these points better than the writer. The results of the water analysis, however, show the presence of considerable pollution and unless the pond is a big one I should say it would be difficult to get good ice from it.

The drainage from a lawn which you suggest is the only source of drainage to the pond, the main supply coming from five springs, would not account for the evidence of contamination found in the water analysis. There must be some other source of contamination.

LEAD IN DRINKING WATER.

April 9, 1912.

DR. G. N. LAWSON, *Health Officer,*
Middle Haddam, Conn.

DEAR SIR:—The sample of water submitted by you on April 4 from a tap in the home of Mrs. S———— has been examined for lead and we find this element present to the extent of about .7 of a part per million parts of water.

As .5 of a part per million parts of water has produced serious illness it is evident that the spring water is taking up lead from the service pipe in dangerous amounts. Lead and lead lined pipe have had to be discarded for service connections in a number of cities because of the solvent action of the waters in use and under such conditions one or more of the following kinds of pipe have been used: Block tin, tin lined, cement lined, wrought iron, or galvanized iron. The last two types frequently cause trouble from iron discoloration of the water and clogging with rust and the others have been objected to on account of their higher cost. Block tin or good tin lined pipe, however, will give very satisfactory results and cement lined pipe, if properly laid, is also satisfactory, and these tyes of pipe will not be affected by the water.

MOSQUITO EXTERMINATION.

May 3, 1912.

DR. A. W. KLEIN, *Health Officer,*
Greenwich, Conn.

DEAR SIR:—On May 2 I visited with you and First Selectman H. P. Crawford some of the places in the Borough of Greenwich where you plan to eliminate conditions favorable to the growth of mosquitoes and I desire to make the following suggestions:

The most important requisite for the multiplication and growth of mosquitoes is stagnant or quiet water protected from the effect of wind ripples, and such breeding places are to be found along the shores of many of our low-lying ponds and in the marsh lands, where weeds grow up to protect the surface of the water from disturbing ripples. If all such places could be eliminated the mosquito problem would be a simple one. A very small area of protected water, however, is sufficient for a breeding place where millions of mosquitoes may develop in a season and this fact is of importance because citizens who are paying the bills for improvements are frequently led to believe that the work of mosquito extermination has been a failure because one or two breeding grounds in the vicinity have been overlooked. In order to get the best results the work should be taken up in a comprehensive manner both by the bor-

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ough officials in eliminating breeding places on public land and by the citizens in removing such conditions on their own property.

With reference to the places visited yesterday I will say that the breeding places around the shore of Bruce Pond can be eliminated by filling in with soil and covering with gravel to make the banks steep, and in case it is found that mosquitoes are developing on the surface of the pond they can be killed by treating the water surface with crude petroleum. The latter method is only a temporary measure, however, and must be repeated at intervals as the oil disappears by evaporation or is carried away by the currents and winds. The pond is a small one and as the water is nearly stagnant the advisability of gradually filling in the depression should be considered if filling material is available. In this case it would be necessary to carry the surface water drain at the upper end of the pond through to the outlet pipe.

The depression across the road from Bruce Pond can be easily filled in and I believe this will be the most practical way to eliminate the objectionable conditions which exist there at the present time.

At the Mill Pond those places along the shore which are shallow and make ideal breeding places for mosquitoes should be filled in to make the banks steep and should be covered with gravel or stone or sand to keep out vegetable growths. The application of crude petroleum may also be advisable as the pond is nearly stagnant. Another important step would be the installation of tide gates so arranged that the pond could be lowered as far as possible say once a week with the outgoing tide. In this way mosquito eggs or larvae which have begun to develop on the surface of the pond will be carried out to sea.

If there are any marsh lands in the limits of the town where breeding places occur ditches say ten inches wide and perhaps thirty inches deep with straight sides will drain these grounds and will greatly reduce the trouble from mosquitoes. Millions of feet of such ditches have been dug in the marsh lands in New Jersey and the results have amply demonstrated the value of such work.

This work means the expenditure of some money, but the proper and careful application of methods necessary to eliminate the mosquito breeding places will produce not only greater health and comfort to the citizens but will rid the locality of any reputation it may have developed as a malarial district.

WILLIMANTIC WATER SUPPLY.

July 1, 1912.

MR. DANIEL B. O'CONNOR, *Chairman Water Committee, Willimantic, Conn.*

DEAR SIR:—Regarding the inspection of the water shed of the public water supply of Willimantic which I made on June 13th at the request of County Health Officers Hinman and Yeomans, I would say that I have written them in answer to the questions they submitted.

I consider all the places pointed out by you as more or less of a menace to the purity of your water and to the health of the people of Willimantic, and they show the urgent necessity of securing a better supply of water for your city. What the local Health Officers can do towards discontinuing these sources of pollution on the water shed is a matter on which the County Health Officers can advise you, but it is my opinion that to protect your water supply by cleaning up or controlling this water shed of 162 square miles with a poulation of more than six thousand people, and with several mills along the streams, will be very expensive for the city and unsatisfactory in the end. Of one thing I can

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assure you, the State Board of Health will not approve of any plan to take water from a running stream and distribute it directly to the people as is now being done. If the water went first to a large reservoir where long storage allowed the action of sunlight, sedimentation, and bacterial influences to eliminate contamination of a dangerous character, no further purification would be necessary, but the use of a running stream from an inhabited drainage area, where the interval between the time of contamination and the public use is too short for the elimination of dangerous conditions, represents a constant menace to the health of the city.

On October 20th, 1911, Mr. Newlands, chemist of our Board, and myself met by appointment Mayor Dunn and your Water Committee at the City Hall in Willimantic. We went over the water situation and gave such advice as we had to offer. As I believe you were not a member of the committee at that time I will repeat as far as I can what was then said: After advising that steps be taken at once to improve your supply it was stated that it is not the function of the State Board of Health to advise in detail what would be the best and most economical system of water purification for any community to employ, nor would any advice the Board might give be binding upon the city.

There are three methods of purification that might be used; namely, by chemical means, by storage, and by sand filtration. To determine which is the best adapted to your particular needs the city should employ a competent sanitary engineer to advise in this matter and his advice should be followed. We have in this state three sand filtration plants, those at New Haven, South Norwalk and Putnam. I am sending you under separae cover a pamphlet entitled "South Norwalk Public Utilities," in which you will find a description of their filtration plant which was recently completed. In a conversation not long ago with Mr. Hatch, chairman of their Water Board, he told me that the filtration plant was the best investment South Norwalk had ever made.

This letter I think will reach you in time for your July meeting as I promised.

PUBLIC WATER SUPPLY.

July 19, 1912.

MR. JOHN H. WALSH, *Supt. Water Dept.*
East Hartford, Conn.

DEAR SIR:—Enclosed please find report on the sample of water from the East Hartford supply which you brought to the laboratory on July 15.

The results show no evidence of serious contamination at this time and while the increased number of bacteria may be due partly to the dead ox which was found in the brook, your prompt removal of the animal before it had become seriously decomposed eliminates a condition which was objectionable, but not necessarily dangerous. I am more concerned with your answers to my questions regarding the capacity of your reservoirs. The total capacity is less than three days' water consumption, and the storage capacity would be much less than this during wet weather when the water is running over the spillways.

The storage of water in reservoirs is a legitimate and effective method for guarding against accidental contamination of streams used for drinking purposes but when storage is to be used as a protective measure the capacity of the reservoir must be great enough to allow time for sedimentation, sunlight, and other purifying influences to act in eliminating disease germs before the water reaches the mains. Faith in the old

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theory that running water purifies itself has resulted in such a long list of serious water borne epidemics throughout this country, and wherever running streams from inhabited drainage areas have been used, that it is unnecessary to dwell upon the danger of using such a supply. The fact that such supplies are used and have been used for years without serious results, is simply evidence that no one on the drainage area contributing to the intermittent contamination of the stream has suffered from typhoid fever or disease capable of being carried by water, and does not prove that the public is in no danger in using such a supply.

You have been fortunate in the past in not having any serious contamination of the streams used for your supply and while similar conditions may continue for years it is poor economy to wait until after a disastrous epidemic has occurred before putting in protective measures which will guard against such a result. You can do no better public service than to urge prompt action in the adoption of some measure which will eliminate the danger of a water borne epidemic in the future.

STREAM POLLUTION.

August 17, 1912.

MR. W. H. HOWES,
Meriden, Conn.

DEAR SIR:—Replying to your letter of the 15th inst, I am sending you under separate cover copy of our last annual report, where on page 9 you will find the opinion of the Board relative to the subject of stream pollution, also on page 203 the description of the present Meriden sewerage plant. The disposal of sewage is a very important problem in Connecticut and constitutes, I believe, one of our most pressing sanitary needs, demanding legislation on the subject. The proper disposal of factory wastes constitutes a very difficult problem and differs from the disposal of household wastes, depending on what the composition of the waste is. For instance, in Rockville, where the woolen factories predominate, the wool fibre and animal grease interfere with the action of the filter beds, but processes can be employed to recover these which have some value and contribute to the cost of the recovery. In Manchester with its silk factories, the gums and resins from the cocoons constitute another problem. In New Britain, with its foundries, the iron and acid wastes interfere with the action of the filter beds, clogging them with the iron deposits.

At the Stanley Works a process has been installed for recovering the iron and acid in the form of a bi-product which is salable.

REPORT ON WATER SUPPLY OF STAMFORD MANUFACTURING CO.

March 20, 1912.

DR. J. H. TOWNSEND, *Secretary State Board of Health,*
Hartford, Conn.

DEAR SIR:—On March 19, in compliance with your request, I went to Stamford with you, County Health Officer George E. Hill, Esq., and Town Health Officer Dr. R. W. Crane, to examine the water supply of the Stamford Manufacturing Company, and I have the following to report.

The supply, which serves about two hundred people at the factory and in houses owned by the Stamford Manufacturing Company, is obtained

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from a reservoir formed by a dam across the Noroton River, a few hundred yards northwest of what is known as Holly Pond and on the town line between the towns of Stamford and Darien. The main branch of the Noroton River rises about two miles northwest of New Canaan. Another branch rises in Rockwell Swamp, in the village of New Canaan. This branch receives considerable drainage contamination from a portion of the village which has grown up around the swamp and the river or its tributaries is further contaminated as it passes through the villages of Talmadge Hill, Springdale, and Glenbrook. None of these places has a sewerage system, but direct contamination of the stream from nearby privies, barns, and cesspools is evident. Examinations of samples taken on August 17, 1911, from four points along the stream, showed that the water is very badly polluted.

It has been the policy of the local Health Officer in the past to eliminate, as far as practicable, direct pollution of the stream from privies and cesspools, and while this will tend to reduce the possibility of the occurrence of local nuisances, the practical elimination of dangerous and objectionable contamination is impossible by this means when rapidly growing villages are located along the shores of the stream as is the case here. Houses and outbuildings are in many cases close to the water's edge and, as has been said, contamination of the water from some of these places is evident.

At the reservoir intake a small coke strainer has been installed through which the water passes to the main, supplying about twenty houses and the company's factory. The strainer has, presumably, been installed for the purpose of purifying the water, but such an arrangement simply gives a false feeling of security to the users, as a strainer of this type has no practical value in the removal of dangerous germs.

Infection of the stream from a typhoid patient in one of the villages contributing to the present contamination, would undoubtedly precipitate a serious epidemic among the users of this water and freedom from this condition is due to good fortune rather than to the protective measure adopted. I believe the use of this supply should be prohibited unless an efficient filter or purification plant is installed and properly maintained. If this cannot be done at a reasonable cost, a purer supply should be obtained.

Regarding the use of the reservoir for harvesting ice, it may be said, that as ice in freezing mechanically forces out of the water very large amounts of foreign matter, it is possible to get a good quality of ice from water which would not be suitable for drinking purposes. The numbers of bacteria imbedded in ice are also reduced during storage, thus reducing further the chance for infection with disease germs when the ice is used for domestic purposes. In view of these facts, I would suggest that an examination of the ice from this reservoir be deferred until it is to be put on the market, when the results will give a fairer estimate of its quality.

Respectfully submitted,

JAMES A. NEWLANDS,
Chemist State Board of Health.

REPORT ON SANITARY INSPECTION AT TWIN LAKES.

May 17, 1912.

DR. J. H. TOWSEND, *Sec. State Board of Health, Hartford, Conn.*

DEAR SIR:—On May 10th, with Health Officer Bissell, of the town

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of Salisbury, I inspected the Twin Lakes House, owned by Mr. Thompson, at Twin Lakes, Conn.

The hotel stands close to the north shore of the lake and the surrounding ground is only a few feet above the level of the water in the lake. There is a swamp in the rear of the property from which, at this time of the year, a small stream of water flows into the lake. The hotel's water supply is from a spring on the hillside at some distance, and is probably good.

The sewage from one water closet and one or two wash bowls empties into a cesspool northeast of the house. This cesspool has been in use only a few years, and is reported to be in good condition. The drainage from the kitchen sink empties onto the surface close to the house and, without doubt, must cause objectionable odors during warm weather.

As the property covers only a small area of low-lying land, the question of sewage disposal is difficult.

I should recommend that the sink drainage be discharged into a new cesspool southwest of its present outlet and that sub-soil drains, laid about a foot below the surface, be led from it under the lawn southwest of the house, in order to distribute the overflow to the grass roots for absorption.

If the drains are not laid too near the lake, not extending over half way from the house to the water's edge, there would be little danger of contaminating the lake water.

On account of its location special care should be taken to keep this property as clean as possible at all times.

Yours truly,

GEORGE C. HAM,
Sanitary Inspector.

REPORT ON ADDITIONAL WATER SUPPLY FOR THOMPSONVILLE.

July 31, 1911.

THE THOMPSONVILLE WATER COMPANY,
Thompsonville, Conn.

GENTLEMEN:—On July 28th and 31st, 1911, we, the undersigned members of the Committee on Water Supplies and Sewerage of the State Board of Health, visited Thompsonville at your request and inspected the plant of your company there; also a set of plans and specifications for additional service, signed by Merrill & Sears, civil engineers, and C. H. Briscoe, president of said company. These plans are for an additional service reservoir with concrete bottom and sides enclosed by an embankment, and of about one million gallons capacity. This reservoir is to be fed by the springs, which are the present source of supply, the water to be delivered into said reservoir by a line of tile and cement pipe from the springs, and by some additional springs in the hill immediately north of the reservoir and about sixty feet distant. The water from these springs to be led by tile pipes into said reservoir, the pipes to be filled around with broken stone and covered with boards and the boards covered by at least three feet of earth. The surface water is to be dyked off from the reservoir by a ditch and embankment. The dust from the highway is to be kept out of said reservoir by a six-foot board fence on the easterly side and for half the distance on the north and south sides; also there is to be built a six-foot board fence in the same form on three sides of the old reservoir.

We approve of the construction, as called for in your plans and specifications, with the amendments, however, that a strip of land not less

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than forty feet in width, be purchased on the northerly side of the land at present owned by your company, and for the full length of the present ownership, and that the diverting ditch shall be dug near the northerly boundary of said forty foot strip, the ditch to be two and one-half feet deep with slope one and one-half to one. Also, that a cement vault be built at the privy of the house owned by Amos J. Levellie, and the house drain carried in a tile sewer beyond the westerly end of the company's land. Furthermore, if the use of the land between the house owned by Amos J. Levellie and the property of the water company is so changed at any time as to menace the purity of the springs, which it is proposed to divert into the reservoir, we understand that we have the right to order the use of the springs discontinued.

Respectfully submitted,

T. H. McKenzie, C. E.
J. H. Townsend, M. D.
Committee.

REPORT ON SANITARY INSPECTION AT POMFRET.

October 7, 1912.

Mr. Charles O. Thompson, *Health Officer, Pomfret, Conn.*

Dear Sir:—At the request of County Health Officer Hinman, on September 27, 1912, the undersigned members of the State Board of Health visited Pomfret for the purpose of investigating and advising whether any unsanitary conditions existed there which might have caused typhoid fever or be the means by which it was spread, as several cases have occurred in the town during the past two years.

We were unable from the limited investigation which we made to trace the outbreak to any certain source. It is possible, however, that as Pomfret is patronized as a health and summer resort, persons convalescent from the fever and carrying the specific bacilli in their discharges may have infected the sewage, from whence it was carried to susceptible persons by flies or other insects.

This is the more probable because we found objectionable and unsanitary conditions existing with regard to the sewage disposal at the hotel which should be remedied. The sewage is turned onto an open meadow or orchard where it spreads over the grassy ground, coming in contact with the hay crops and the apples which fall from the trees. The sewage is not plowed under or scraped off the surface of the ground, but, with the exception of such as soaks in, remains on the ground throughout the year, making an excellent breeding place for flies and other insects. It can be readily seen what might happen should there be a typhoid carrier among the guests or employees at this hotel and its cottages, who number about one hundred and fifty people at the height of the season.

The water supply at the hotel is probably of good quality as it is pumped from a deep bored well.

This method of sewage disposal should be discontinued and should be substituted by a septic tank and sand filter beds of proper proportions and located at such a place as to be least objectionable, and at such a level as to permit all the hotel cottages to connect with the tank. The scrapings from the filter beds and the deposits of sludge should be removed at proper intervals and immediately ploughed into the soil, also the field over which sewage now flows should be ploughed.

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The Bradley pump well, to which our attention was called, is in a valley below the sewage field of the hotel and other inhabited territory. In flood time this water spreads over the valley to a depth of two or three feet, so that the well is liable to be contaminated by this polluted water flowing down from the surrounding hillsides. This condition should be remedied at once by raising a heavy and wide embankment around the well to a height of two feet above the highest known flood, or the supply should be abandoned.

The filter beds at the school in Pomfret Center are not properly cared for, as the sludge is thrown out in heaps about the beds. This should be removed from such beds as are in use once in two weeks, spread over the land and immediately ploughed under. The sand and gravel on the surface of the beds is too coarse, and it is probable that the fine material originally on the surface has been scraped off and not replaced.

These were the only conditions found to be especially objectionable at this time, although further investigation may disclose other possible sources of infection.

Respectfully yours,

T. H. McKENZIE, C. E.
J. H. TOWNSEND, M. D.,
Committee.

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REPORTS OF THE COUNTY HEALTH OFFICERS

HARTFORD COUNTY.

To the Honorable State Board of Health:

As County Health Officer of Hartford County, I hereby submit my report for the two years ending September 30th, 1912.

In the discharge of the duties of the office a great deal of time is taken in consulting with and advising people who come from all over the county with complaints pertaining to subjects, most of which do, and all of which the people believe come under the jurisdiction of the Health Officers. The subjects thus brought up are varied, and, while they sometimes teem with neighborhood quarrels, and sometimes with supposed neglect of the Town Health Officers, they, as a rule, relate to some nuisance from which the complainant or their families have suffered, and which require the intervention of this office for their abatement. The numbers of such complaints increase from year to year. Besides such consultations there are those with the several Town Health Officers and physicians.

The enforcement of the law relating to vital statistics, necessitates frequent visits by the County Health Officer to the offices of the registrars in the several towns in the county. I emphasize to the registrars that their duty as to certificates of births, marriages and deaths does not end in recording such certificates; but where such certificates do not contain the information called for and which the person giving the certificate can readily obtain, the registrar should refuse to accept such certificates, and then if the certificates are not properly corrected the matter should be referred to this office. The registrars are also required to obtain and record in their office all births, marriages and deaths, if any, certificates of which have not been returned to them. And as children frequently are not given a Christian name until after the time when the certificates of their birth in pursuance with the law has to be returned to the registrar, registrars in such cases are required to obtain and record such names. Most registrars understanding the value of perfect records and the uselessness of incomplete records, do their best to make the records in their office perfect. Many of the towns, even where there is a large percentage of foreign population which is constantly changing, make their records almost complete.

Guided by some power which it is difficult to understand, many people will employ quacks and unlicensed, incompetent midwives, paying them always good, and frequently very large fees, in many cases much larger than would be required by competent physicians. So long as such a condition continues, so long a strong inducement is held out for the violation of the medical practice act. Besides the people who employ quacks, unlicensed midwives, etc., usually protect them and make it very difficult to obtain evidence. Prosecutions are brought whenever evidence which will warrant a conviction can be obtained.

The law relating to the sale of poisons, barber shops, etc., is generally well observed throughout the county.

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The Town Health Officers in the several towns keep informed as to the conditions of ice ponds and public water supplies. They also make priodical investigations of the sanitary conditions of school rooms and the school outbuildings, all of which is reported to this office.

In the discharge of the duties of this office, I have had something to do on five hundred and sixty-two (562) days; I have been out of town on two hundred and thirty-eight (238) days; have records of nine hundred and twenty-one (921) consultations; and have written one thousand and thirty-one (1,031) letters.

Respectfully submitted by,

DANIEL A. MARKHAM,
County Health Officer of Hartford County.

NEW HAVEN COUNTY.

To the Honorable State Board of Health of Connecticut:

GENTLEMEN:—The following report is submitted for your consideration.

The period for which this report is written, has been one of continued activity among the Health Officials of New Haven County. The sanitary laws have been consistently enforced; the statutes requiring reporting of contagious and infectious diseases and quarantine, isolation and fumigation, carried out; the law relating to tenement houses has received attention; the work of the Registrars of Vital Statistics has been constantly supervised for the purpose of improving the records of births, marriages and deaths; the registration of poisons by pharmacists closely investigated; public buildings, including halls and school buildings and the sanitary arrangements connected therewith, have received the attention of the local Health Authorities; all the ice ponds in the county, from which ice is taken for either cold storage or domestic uses, have been inspected and unsanitary conditions abated; the laws relating to the care and disposition of bodies of deceased persons by embalmers, undertakers or persons in charge, is well understood, but its enforcement has involved a number of prosecutions; reported violations of the Medical Practice Act required investigation; consultations with Boards of Health and Health Officers have been frequent, and co-operation with the different departments of State, effecting public health, has been maintained; meetings of County and Town Health Officers held during the period for which this report is written, were well attended and showed an attendance of seventy-five per cent. of the local Health Officials of the county.

Under the general powers conferred by the statutes, and the duties imposed, there has been supervision of the Health Officials in the county and co-operation in the enforcement of the sanitary laws. Four hundred and thirty-six nuisance cases were reported by the Town Health Officers. In some of these cases prosecutions were brought to secure the enforcement of the orders issued, but in the majority of instances, the suggestions of the local Health Officer, made in the form of a written order, addressed to the property owner, were carried out.

In several towns permanent improvements in the sanitary conditions were made, under the supervision of the Town Health Officer, with the advice of the Secretary of the State Board of Health. In connection with this work, the duty of advising, in each case, as to the powers of the Health Officer, and the drafting of proposed orders in legal form, required inspection of local conditions, conferences with the Health Officers and in many cases, meetings with the property owners themselves. A complete daily record is kept from which information as to each particular case can be given when required.

In several towns, changes were made that eliminated the drains, which in former years have been connected with the streams, ponds and rivers.

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Cesspools have been constructed to care for drainage, which was contaminating sources of drinking water. In cases where analysis of well water by the State Board of Health has shown contamination, the wells have been condemned and their use forbidden. Water closets situated near the water supply have been improved by the construction of cement vaults, under orders from the Health Officer.

In some localities, where a public water supply has been installed and no provision made for the disposal of sewage there has been a tendency to drain into a convenient stream. Many times, especially during a dry summer, the water gets so low that a serious nuisance is created, the stream becoming an open cesspool. This practice should be discouraged. While the law now forbids such draining of sewage into water which is used for drinking purposes or for ice supply, there is no provision to protect such cases as are referred to above, except upon the general theory of a nuisance being created, which is detrimental to the public health. This condition suggests the necessity of an amendment to the sanitary regulations of the towns in the state, that will prevent it in the future.

The sanitary laws of the towns in this county are the same as when the last report was submitted, with the exception of the Town of Hamden, where it became necessary to take action with reference to the receiving, unloading and carting of stable manure, which has been shipped to a section of the town called Highwood, for several years, during the summer months. The development of the community as a home section of the town, made it imperative, in the opinion of the Health Officer, that the nuisance caused by the presence of this fertilizer during the summer, should be abated. Notices were issued as provided by statute and hearings held, both by the Town Health Officer and the State Board of Health, the following regulation being enacted, after its approval by the State Board of Health:

"SANITARY REGULATION NO. 30 OF THE TOWN OF HAMDEN.

"No New York stable manure shall be brought into this town to be located at the Stock Yard Switch so-called, between June 15th and October 1st of any year.

"The foregoing regulation is hereby adopted as a sanitary regulation of the town of Hamden.

"Dated at Hamden, Connecticut, this 25th day of August, A. D., 1911.

"WALTER S. LAY, M. D.,
"Town Health Officer of Hamden.

"Approved by the State Board of Health, October 1st, 1911.

"JOSEPH H. TOWNSEND, M. D.,
"Secretary."

Since the adoption of the regulation, no complaints have been received.

The reporting of contagious and infectious diseases, not excepting pulmonary tuberculosis, is now generally carried out by physicians in New Haven county. There has been no occasion to prosecute for failure to comply with this law. It is probable that even now, some cases of tuberculosis are not reported, but the number of reports received, compared with those made during the first two years after the enacting of the law, requiring the reporting of tuberculosis, would indicate a general compliance with the statute.

In connection with such reports received, the Health Officer must placard or quarantine, fumigate and disinfect, in nearly every case. The number of fumigations made in this county since the last report, is eleven hundred and twenty-six. While quarantine orders were formerly the

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most frequently violated, of any issued by a Health Officer, it has been possible this year to control the actions of the people in quarantine without arrest, except in two cases. One of these cases was first brought to a Borough Court, where conviction was had and an appeal taken to the District Court.

After a trial before a jury, during which many technical defenses were made, a verdict of guilty was rendered and a fine imposed. During every epidemic of contagious disease that has occurred, special efforts have been made to enforce strict quarantine, and the results obtained justified the action taken.

In the borough of Naugatuck, an epidemic of smallpox occurred during the spring and summer of the present year. One hundred and ninety-three cases were reported to the Health Officer. From the day the first cases were reported, the borough authorities did everything possible to assist the Health Officer in his efforts to control the disease. A temporary isolation hospital was provided, and in families where quarantine was considered impractical, the patients were removed to the place prepared for their care. The Health Officer received the co-operation of the physicians, and all cases were reported promptly. Strict quarantine was enforced, but in some cases it became necessary to call upon the Police Department, for men to patrol the streets, in order to prevent the violation of the orders of the Health Officer. General vaccination was ordered. The fact that only four cases occurred in adjoining towns, that could be traced to Naugatuck, during the time the epidemic was going on, shows excellent results from the efforts put forth to confine the disease to the community in which it first appeared. One case in Seymour was discovered in the early part of the epidemic, but the efficient work of the local Health Officer prevented its spread.

An epidemic of scarlet fever occurred in the Town of North Haven during the fall of 1911. Schools were closed and a strict quarantine placed upon every family where the disease occurred. The people of this community rendered valuable assistance to the Health Officer by their efforts to prevent the spread of the disease. There were several instances, however, in which it was necessary to call upon the authorities, to notify those who had been quarantined, that their failure to comply with the orders issued, would involve arrest and prosecution when quarantine was released. In this, as in the Naugatuck epidemic, the disease was kept within the town where it first appeared.

The value of the assistance rendered by your Honorable Board, through the laboratory in Middletown, in determining diagnosis in diphtheria, was demonstrated in the Town of Orange. For a period of several weeks, cases of diphtheria were reported to the Health Officer. Quarantine and fumigation were enforced, but the disease continued. An investigation disclosed the fact that the cases were occurring among the children in a certain room of the school. Culture tubes were furnished and specimens taken from the throats of every child in the room. These were sent to the State Laboratory for examination. The report made located the child that was the carrier of the disease. She had not been ill and up to the time the discovery was made, attended school regularly. The child was placed under quarantine and kept from school until all traces of the disease had disappeared. There were no more cases reported from that school. Many instances might be related, where the Laboratory has proven its value to the health officials of the county, both in their efforts to control contagious diseases and in determining the possible source of infection for typhoid fever.

The distribution of anti-toxin by the State Board of Health, under the law of 1911, through the medium of the Health Officer, has been the means of enabling the health officials to control diphtheria so efficiently that epidemics of this disease are now the exception. Experience has

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shown that in towns where quarantine is maintained for diphtheria until a negative report is received from the State Laboratory, the disease is more quickly controlled and fewer cases occur.

Physicians by their co-operation with the health authorities, in cases of contagious and infectious disease, have helped to make it possible to control every outbreak of diphtheria, scarlet fever, smallpox, and many other diseases that are considered contagious or infectious.

The Public Acts of 1911, relating to the care of tenement houses in cities and boroughs of the state, defined the duties of the owner and increased the power of the health officials. Since the statute referred to became operative, a systematic investigation has been carried on by the local officials and many improvements in the conditions surrounding tenement houses, obtained. In one city a census was taken of the residents of the tenement houses which showed that in some cases, too many persons were being housed in rooms condemned by law. In general, it is considered that such a law is desirable, to protect the health, not only of those who must live in houses which are inexpensive and hire the cheaper class of rents, but of the public, who are exposed to the possible contagion or infection, which in many instances, can be traced to crowded and unsanitary conditions of our tenement house districts.

After a campaign lasting several weeks, during which the requirements of this law were brought to the attention of the property owners who would be affected by it, orders were issued which required the owners to make their properties come up to the standard required by law.

The orders issued referred to the unsanitary conditions of the yards, halls and drains, and to the furnishing of proper receptacles for garbage. After the time limited by the orders, in which the work should be done had expired, another investigation was made, and in every case where the improvements suggested had not been carried out, the owners were prosecuted. There were ten cases brought in one locality. The conditions are very much improved at the present writing. It seems unfortunate that the Tenement House Law, so-called, should be limited in its operation to cities and boroughs. There are many tenement properties in some of the larger towns, where the community has never taken up the plan of organizing a borough, that ought to be condemned in their present condition. They are unfit for human habitation, but the Health Officer can only regulate the sanitary conditions when they become a nuisance. If any changes were made in this legislation, it is suggested that it be made to apply in all of the larger communities of the state whether they are cities, boroughs or towns.

The enforcement of the law relating to Vital Statistics, continues to form one of the important duties, which a County Health Officer must perform, and one that involves a great deal of time. There seems to be no way in which this work can be accomplished, except by personal examination and comparison of the records. Each month reports are received from the Superintendent of Vital Statistics of birth certificates and marriage licenses that hve not been returned, within the time required by law. Individual cases are investigated and the facts reported as found. There is not a physician or clergyman within this jurisdiction who does not make his returns promptly, as a rule; occasionally, a clergyman coming into this state from one where the laws are not the same, fails to make returns, until his attention is called to the requirements of Connecticut Laws.

The annual examination of the records in the office of each Registrar of Vital Statistics, comparing the records with the original certificates, examining each cerificate, to ascertain whether it has been properly dated, endorsed, recorded, etc., involves the handling of several thousand returns each year.

In the smaller towns of the county, errors and omissions are found

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as well as in the larger communities. It is a satisfaction to be able to report to this Honorable Board that in every town or city where a sufficient number of certificates have accumulated, they are all bound in permanent form. Investigations made in the city of Waterbury during the past summer showed that more than fifty per cent. of the births occurring among the families of some of the foreign population, were never returned to the Registrars of Vital Statistics. This must be overcome in some way, as it destroys the accuracy of all of the vital statistics of the state.

Sextons' returns are very much improved, while the embalmers and undertakers are making fewer mistakes in their death certificates. Two meetings of the Registrars of Vital Statistics, held in New Haven, for the purpose of securing more uniform action, resulted in a much better understanding of the laws relating to their duties.

The possibility of failure to record sales of certain poisons or to properly mark the package when sold, can only be determined by personal investigation. Each pharmacy in the county has been visited every year and the records of this office compared with those kept by the proprietors. Notwithstanding the fact that prosecutions have occurred in former years, there were new cases to be brought for failure to comply with the law. Ten prosecutions were brought in one of the cities in the county, and upon a plea of guilty, the miniumm fine of ten dollars was imposed. It should not be possible for a minor, working as a clerk in a pharmacy, to sell or distribute poisons of any kind.

The annual inspection of ice ponds, carried out as before, resulted in very few conditions being found which required action to be taken by the Health Officers of the county. One pond, however, was condemned as a source of supply for domestic use, and has been added to the limited list of such ponds within the jurisdiction. At this time, one pond is under investigation by the Secretary of the State Board of Health.

The laws relating to Vital statistics include those which regulate caring for and disposition of bodies of deceased persons. Until the past year it has not been necessary to prosecute for violation of this law, especially with reference to the removal of bodies of deceased persons from one town into another without a removal permit, but complaints were received that this was being done and the cases reported were investigated. The parties were brought before the town court and their cases adjusted upon the payment of fine and costs.

A limited number of complaints have arisen where violations of the Medical Practice Act were charged. No prosecutions have been brought under this law, as the cases reported did not justify such action.

The desirability of frequent and regular conferences among the local health officials of the county, was demonstrated long ago and the plan of holding monthly meetings of County Health Officers and quarterly meetings of local Health Officers has been maintained. Meetings of all the health authorities of the state with your Honorable Board have been attended. There are no changes to report in the Health Officers of the county as per appointment by the County Health Officer. One change has occurred in the city of Waterbury, where the appointment is a political one, and for a term of two years. One borough has gone back to the town form of government, thus increasing the duties of the Health Officer.

We would acknowledge the assistance received from the co-operation of the State Board of Health, the State Bacteriologist, the Secretary of your Honorable Board, the Dairy Commissioner, the Commissioner of Domestic Animals, the physicians and clergymen of the county and the municipal authorities. A complete system of co-operation, between all who are charged with some duty affecting public health, is important, as the interests of all are the same.

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There are still many items that could be referred to, but the limitations are such as time and space, that we will refer you to our records for such additional information as you may desire.

Respectfully submitted,

C. E. HOADLEY,
Health Officer of New Haven County.

NEW LONDON COUNTY.

To the Honorable State Board of Health:

A report of my doings as County Health Officer of New London County, for the two years ending September 30th, 1912, is hereby respectfully submitted.

During the year ending September 30th, 1911, I was occupied eighty-one days in the performance of my duties.

Eighteen nuisances were reported to me, all of which were promptly investigated and steps taken to secure an abatement in each case, which was satisfactorily accomplished without prosecution, except in one instance where it was necessry to invoke the aid of the court. In the above work it was necessary for me to visit five different towns in the county one or more times. In addition to the above there were many nuisances promptly abated upon the order of the local Health Officers.

I brought one prosecution for a violation of the Medical Practice Act and secured a conviction. One other complaint was made to me, but upon investigation I was unable to secure sufficient evidence to warrant a prosecution.

During the year ending September 30th, 1912, I was occupied something over eighty full days in the work of the office.

Early in the spring I received complaints of the sale of "bob veal" in the town of Bozrah. After investigation I brought three prosecutions and secured a conviction in two of the cases, the offenders paying substantial fines and costs. The third case went to the Superior Court on binding over process and was nolled by the State Attorney on account of lack of evidence. The result of these prosecutions was to lessen the sale of "bob veal" in this county, but I am satisfied that the law is still frequently violated in this respect, and am now trying to get evidence to warrant the prosecution of several alleged offenders.

Although improvement is noticeable, physicians are still careless in regard to reporting cases of tuberculosis to their local Health Officer, and I deemed it my duty during the year to prosecute one of the most prominent physicians of Norwich for failure to report a case of tuberculosis. Conviction was secured before the Police Court of Norwich and a small fine imposed which the court afterwards remitted and allowed the accused to depart upon payment of costs. This was entirely satisfactory, as there was no desire upon my part to have a severe penalty inflicted, but my purpose in bringing the prosecution was rather to let the physicians in general know that this law must be obeyed.

I brought two prosecutions for failure to abate nuisances, consisting of unsanitary slaughter-houses, both in the town of Norwich, but outside the city limits. The result of these prosecutions was the practical abandonment of one slaughter house and a much-needed cleaning up of the other. I was called to visit several other towns in the county to investigate alleged nuisances, but all were abated without the necessity of prosecutions.

Several violations of the law relative to the practice of midwifery were reported to me and investigated, but in only one case was there sufficient

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evidence to warrant a prosecution, and that case was nolled upon the woman's paying the costs and promising never again to offend. She was a poor Polish woman and the infliction of the minimum penalty would have meant her going to jail, so I took the course above stated. The moral effect of the prosecution was most excellent.

During the two years covered by this report I visited nearly every town in the county, one or more times, for the purpose of inspecting the records of vital statistics. The matter of binding and indexing vital statistics, under the law passed by the last General Assembly, was taken up with the different registrars, and in all towns where a sufficient number of certificates exist, they have now been bound.

All public buildings and schoolhouses were properly inspected each year; a large number of applications for the analysis of water were approved; quarterly bills of the Town Health Officers were duly audited; many consultations were held and much correspondence attended to, all of which is a matter of routine and needs no enlarging upon.

The few changes in the personnel of the local Health Officers were reported to you when made. Most of the local Health Officers have been in the service for years and I can speak highly of the intelligent consideration that they give to their work.

It does not seem necessary to go into the matter of contagious diseases in this report, as you are already familiar with the record of such diseases as reported from the different towns of the county.

Respectfully submitted,

ARTHUR M. BROWN,

County Health Officer for New London County.

FAIRFIELD COUNTY.

To the Honorable State Board of Health:

In accordance with recent custom the report herewith submitted covers a two-year period ending September 30, 1912.

There has been no change in the incumbents of the office of Town Health Officer, except in two instances. Dr. Charles B. Keeler, of New Canaan, Health Officer of town and borough since 1893, declined a reappointment October 1st, 1911, and I appointed Dr. Edmund J. O'Shaughnessy to both positions.

In Wilton there had been for some time a temporary Town Health Officer from an adjoining town. At the request of many citizens, I appointed Thomas J. Scanlon, M. D. Town Health Officer. All other incumbents have been reappointed as their several terms have expired.

The work of the Town Health Officers, as the same has come under my observation, has been efficient and satisfactory. In general it may be said that the education of the public along lines of better sanitation has shown itself in the increased willingness of individuals to comply without objection with reasonable orders of Health Officials and in an increased demand for action of such officials. Conditions which ten years ago would have escaped notice, are now complained of to the Health Officer by the public and abated by him.

Nearly every community, however, contains some element unwilling to promptly co-operate with the Health Officer in the abatement of nuisances. It is with these that I have had to deal to a considerable extent in the period under notice.

I have brought criminal prosecutions in a number of cases, but in proceeding against those who are neglectful of the orders of a Health Officer, I have usually done so by injunction; feeling that the main purpose

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should be to bring about an immediate and permanent compliance with such orders and abatement of the nuisances, and that the infliction of a small fine leaves the nuisance in the same condition as before unless voluntarily abated.

This policy seems to have worked effectively, and I have found that in nearly every instance where a defendant has been summoned into court to show cause why an injunction should not be issued to restrain further maintenance of a nuisance, he has either abated it or started the work of abatement immediately. In such cases, where complete abatement has followed, the case has been dropped without further action.

I found it necessary to bring an action on account of conditions of the school outhouses in the town of Weston, which was sufficiently unusual to merit notice here.

Under the law of 1909 consolidating all school districts under town management, a bi-partisn school committee of twelve was elected in Weston. For what appear to have been political reasons, this committee became "deadlocked" and were unable to organize or do business. For want of attention the condition of the school outhouses became such as to attract the attention of the Health Officer who issued his order directing the sanitary amendment of this condition. No action on the part of the school committee followed. Of the three selectmen, only two had qualified, and these two were similarly "deadlocked" and no action could be obtained through them.

The matter was then referred to me, and after consultation with some members of the school board and other interested parties, I brought an action in the Superior Court in the name of the state against the town, the school committee and its individual members, who were summoned to appear before Judge Reed, to show cause why a temporary injunction should not be forthwith issued to restrain them from further maintenance of the offensive conditions.

The town and certain members of the school committee appeared with counsel prepared to contest the matter, each by showing that the other party was to blame for the situation. Judge Reed took the position that it mattered little who was at fault, so far as the action was concerned, but that it mattered much that such conditions existed, and advised an immediate agreement of the committee and the selectmen, intimating that an injunction would be issued at once if such agreement were not reached. A recess of court for the purpose resulted in such an agreement being entered into, signed both by the school committee and the selectmen undertaking the immediate abatement of the unsanitary conditions. The town paid the court costs and the case was dropped.

Only one other injunction case out of a considerable number brought, actually reached a contested trial in court. That was against a Ridgefield property owner for maintenance of unsanitary conditions upon tenement house property in that town. A hearing was had before Judge Scott of the Court of Common Pleas, at the termination of which an adjournment was had to enable the defendant to carry out his promise made in court that he would forthwith comply with the order of abatement, such compliance followed and the case was dropped.

I found it necessary to bring a prosecution under the so-called embalmers' law, in Stamford. Sec. 4 of Chapter 81, of the Public Acts of 1907, provides a penalty for any person who shall sign a certificate attesting the preparation or embalming of the body of a deceased person unless said body was prepared or embalmed by him.

A resident of New York died in Greenwich. A New York undertaker, not licensed in Connecticut, was called and prepared the body for burial. He then found that the registrar could not issue a removal permit, based upon his certificate. He thereupon went to Stamford and obtained from a licensed undertaker in that town, a certificate attesting that he, the Stamford undertaker, had prepared the body for burial and upon

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this certificate obtained the neessary removal permit. Upon learning the facts I issued a complaint against the Stamford undertaker, who, upon a plea of guilty, was fined in the City Court of Stamford.

The New York underaker escaped prosecution by reason of the fact that he remained beyond the jurisdiction.

The medical practice act has suffered several violations which called for my attention. One, at least, of these instances of violation emphasized again the ease with which this law is, under certain conditions, capable of evasion.

Several itinerant "doctors" travelling through the state together, with open air exhibition to attract the public, treated numerous ailments "for compensation gain or reward." They were accompanied by a man who had a Connecticut license to practice, issued in 1893 under the clause permitting any person, then engaged in actual practice, to register without examination.

Diagnosis was made by the unregistered members of the syndicate and the patient was instructed to call later, when the medicines were handed him by the registered member and the fee received by him.

It has long been apparent that to fully carry out the purposes of the law and afford protection to the public, this statute should receive a careful overhauling at the hands of the legislature in the light of the experience of nearly twenty years under it.

I brought criminal prosecutions against two other persons under this law, in each of which conviction was had in the lower court. One served in jail and the other appealed to the Court of Common Pleas where he forfeited a bond.

Proceedings for an injunction were brought against the borough of New Canaan on account of the nuisance then arising out of the filter beds and settling tanks of the sewage disposal plant. An immediate conference between the borough officials, their counsel and myself, resulted in a working agreement whereby a considerable improvement of conditions was obtained without serious detriment to the interests of the borough. The borough officials were and are working at a great disadvantage in conducting this system owing to conditions over which they have not entire control, and are, I believe, putting forth every effort to maintain the plant without the creation of a nuisance.

The sewer beds of the Ridgefield system have required my attention on one or two occasions. Nothing further than advice to the Health Officer and Borough Board has been necessary.

Action for the enforcement of certain phases of he so-called Tenement House Law (Chapter 220, Public Acts of 1911) has disclosed one or more particulars in which the law may be improved. It is provided, for example, that no stable, upon the premises of a tenement house, shall be within twenty-five feet of an adjoining dwelling; and a tenement house is defined as one occupied by three or more families. In a case in Bridgeport where action was asked of me by the City Board of Health, the stable happens to be on the premises of a "two family house," but within less than 25 feet of a tenement house. Hence, it is not within the law, notwithstanding the fact that it is much more offensive to the dwellers in the tenement house than it would be if on the rear of the tenement house lot.

The conviction which has within the past few years become a settled one among the general public, as well as sanitarians, that mosquitoes are disease bearers and that malarial diseases are largely, if not exclusively, produced by their bites, has aroused communities particularly along the sound, to active efforts to eliminate mosquito breeding areas. Several towns in Fairfield county have undertaken work on a large scale, the expense of it being met wholly or very largely by private subscription.

Darien was the pioneer in this county in undertaking this work, and

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during the summer of 1911, the salt meadows of that town throughout the entire frontage on the Sound were ditched, for the elimination of the stagnant water which alone is the breeding place of the mosquito. My information is that the results were eminently satisfactory and that during the summer of 1912 the dwellers near the salt meadows were almost entirely relieved of the pest of previous summers.

During the summer of 1912 the towns of Norwalk and Fairfield have undertaken a similar work, but it is too soon to report results.

These movements for the elimination of mosquito breeding areas have raised an interesting legal question. The mosquitoes emanating from these meadows are, as appears from the investigations of the state entomologist, in the main, not the malarial producing mosquito. It is not capable of demonstration, therefore, from our present knowledge that they are a menace to the public health, in the sense that they specifically produce disease. The discomfort and annoyance which they produce might be said, in extreme cases, to menace individual health.

The question, therefore, arises, whether the elimination of their breeding places is a work in which the authority of the Health Officer may be invoked, as there are sometimes found owners of salt meadows, who, residing far away from them, are not interested in such elimination work, and who deem the ditching and draining of their land a detriment to it. There being some doubt as to the power of the Health Officer to declare a mosquito breeding place a nuisance, detrimental to the public health without proof that the mosquitoes bred therein are of the disease producing variety, I believe legislation might be wisely framed and enacted which would enable the Health Officer to take such action.

There are other towns in the county, notably Greenwich, where similar action to that taken in Darien, Norwalk and Fairfield is in contemplation and doubtless if the experience of the last mentioned towns is satisfactory, it will be underaken in 1913.

Nor is work of this sort likely to be confined to the shore towns. Many inland towns have mosquito breeding places of less area, where stagnant fresh water produces like results. Such legislation as is suggested, conferring on the Health Officer jurisdiction in such cases, could hardly fail to be of material advantage to a greater or less degree in every towns whether upon the shore or inland.

It seems unnecessary to include in this report any extended data concerning the prevalence of contagious disease in this county, in view of the fact that the State Board of Health received through other channels much more complete information on the subject than I could give within the proper limits of this report.

I need, therefore, only to refer to such matters relating to contagious diseases as have come to my personal attention.

One case of smallpox in Ridgefield required my advice, and I visited that town immediately on the discovery of the case. The diagnosis of the attending physician (who happened to be also the Health Officer) was confirmed by an expert called in for the purpose. A conference between the Health Officer, the selectmen and myself, resulted in having all proper precautions taken, and a physician and nurse obtained to care for the patient.

Although the patient was engaged as cook in a boarding house, there was no other case in the town.

A very sudden outbreak of typhoid fever in the borough of Shelton was found to have been due to the transmission of the disease in milk. The cessation of the use of the milk was followed by a cessation of new cases.

A condition which demanded some attention is the contamination of a stream from which a manufacturing concern of some size takes its water supply. This supply was originally used only for manufacturing

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purposes, but has been introduced into various dwellings nearby. The stream, contaminated to a greater or less extent throughout its length of seven or eight miles, is, in the opinion of the health authorities of town and state, unfit for use as a domestic supply. The Town Health Officer, having become convinced of its unfitness, was about to issue orders for its disuse, when it was discovered that the dwellings which had been supposed to be in his jurisdiction were just over the city line, and that, therefore, the jurisdiction was that of the city. The matter was brought to the attention of the City Health Officer, who, in turn, referred it to the City Council, in which under the city charter, are vested the powers in sanitary matters. The council has taken no action so far as I am informed and I believe the supply is still in use; although warning of its unfitness for drinking purposes has been brought to the attention of the occupants of the dwellings in question.

The laws relating to the registration of vital statistics are, in the main, well observed. I find, however, that from time to time it is necessary to call attention of physicians and clergymen to the necessity of promptly making return of certificates of births and marriages. There is almost no wilful disregard of the statutes, but certain physicians and clergymen lapse into carelessness if not constantly reminded of the statutory requirements.

The certificates of vital statistics in nearly all of the towns have been bound in accordance with the recent statutes, only recent certificates, being unbound where there are not enough for a complete volume. In five towns there are no bound volumes, but in four of these there are not sufficient certificates for a complete volume.

Respectfully submitted,

GEORGE E. HILL,
County Health Officer for Fairfield County.

Bridgeport, Conn., October 1, 1912.

WINDHAM COUNTY.

To the Honorable State Board of Health:

GENTLEMEN:—I herewith present some of the more important features of health work in Windham county during the two years last past.

The occurrence of most interest in the health department of Windham county during the past two years, and one which caused a vast amount of labor and anxiety on the part of the health authorities and municipal officers was the outbreak of smallpox which first appeared in Willimantic, in February of the present year, followed by the appearance of cases in the town outside the city limits and in three other neighboring towns. The disease was, in practically all of the cases, so mild that no physician was called, and the disease remained unrecognized for some days, during which time frequently the patient kept at work or about town, exposing others to the contagion; also the city had no hospital for contagious diseases and an attempt was made to care for the patients in their own homes, quarantine being maintained by posting guards at each quarantined house. These two conditions combined to make the restricting of the spread of the disease difficult, although surprisingly few of the later cases were directly traceable to the primary cases. Finally, however, the houses under quarantine, some of them in congested localities, became so numerous, that concentration of the cases became imperative and the city secured a house in the outskirts of the town, as a temporary isolation hospital. The City Health Officer, Dr. Keating, had previously been attending all of the cases, and took charge of the isola-

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tion hospital, remaining in quarantine, with nurse, attendants and patients until the last patients were ready for discharge. The total number of cases was eighty-seven, only twelve of which were of the confluent type, and no deaths resulted. The service rendered by Dr. Keating during the twenty-two weeks' continuance of the disease was most faithful and efficient, highly appreciated by the city and Health Officials and deserving of a like appreciation on the part of the general public.

The going into quarantine of Dr. Keating created a temporary vacancy in the position of City Health Officer which I filled by the appointment of Dr. C. E. Jenkins, who performed most capably the difficult duties of quarantine of dwellings in which cases occurred, disinfection and release, as well as the routine duties of the office.

The experience in this epidemic emphasizes the need, previously urged, of a hospital for contagious diseases in Willimantic.

In the town, outside the city limits, twenty cases in five families occurred, the primary cases being indirectly traceable to some of the earlier Willimantic cases before their discovery.

Eastford had ten cases, Woodstock five, and Ashford one, the origin of none of the primary cases being satisfactorily traced.

In September, 1911, an appeal was taken to me from an order of the Town Health Officer of Brooklyn, forbidding slaughtering of animals in a certain location in Brooklyn village. After investigation I decided that the law did not permit an absolute prohibition under the circumstances and modified the order so as to require the slaughtering to be done in a sanitary manner.

In January, 1912, I acted, wth two Town Health Officers, as a committee appointed by the New Haven County Public Health Association to confer with your board regarding the distribution of anti-toxins, and the ruling made by your board on that subject has worked most satisfactorily, in general, in limiting the distribution to cases necessitating its use. The system of distribution adopted should be carefully followed and the authorization of the Health Officer for each individual requisition required. No Health Officer should sign requisitions in advance, in blank, but should pass on each case as it arises, and quarantine the family supplied with the anti-toxin.

At the request of the city authorities of Willimantic, the Secretary of your Board and the health officers of Tolland and Windham counties made an inspection of conditions on the watershed of the city's water works, claimed to be liable to pollute the water supply. Such of these conditions, few in number, as, in the opinion of your secretary, were public nuisances—that is, detrimental to the health and comfort of the locality where they existed, were abated on order of the local Health Officer. The remaining conditions in this county, which were found to be objectionable only from their relation to the water supply were held by me not properly abatable by the health authorities at the expense of the town where located, but by the city, upon proceedings provided for by Chapter 137, Public Acts of 1909, with assessment of just damages in favor of the persons affected.

A similar question arose in Pomfret in September last and was disposed of on the same theory. One nuisance has been abated in accordance with the suggestions made by your secretary and engineer, and the other conditions complained of were held to be proper subject for private action by the owners of the water supply affected.

Unsanitary conditions due to lack of sewerage at Dayville were inspected by me, but have been most creditably eliminated by the owners, without any formal order, by the installation of a modern sewerage plant.

Complaints of nuisance arising from the transportation of garbage from Willimantic and use of the same in Chaplin, were investigated

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and the trouble remedied by the imposition of restrictions in the license for transportation.

A noteworthy improvement, from a sanitary standpoint, has been the installation of a sewerage system and improved streets (mitigating the dust nuisance) in Putnam and the recent acquisition by the city of its water supply, heretofore conducted as a private enterprise.

The new law regarding individual drinking cups has been well observed, with particular advantage in the schools, and the laws relating to public health have been so generally complied with that no prosecutions have been found necessary. Inspection of the records and returns of vital statistics discloses a continuance of the satisfactory conditions noted in recent former reports.

All the Town Health Officers whose terms expired in October, 1911, were reappointed and the only change in 1912 was the appointment of John H. Fitts for Hampton, a change necessitated by the absence from town of the former incumbent. The service of the local Health Officers, most of whom now have long experience in the work, has been most faithful and efficient.

I desire, in closing, to express my appreciation of the prompt and effective co-operation of Secretary Townsend in several difficult matters, especially the smallpox outbreak and the Willimantic and Pomfret water supply problems.

Respectfully,

GEORGE E. HINMAN,
County Health Officer Windham County.

LITCHFIELD COUNTY.

To the Honorable State Board of Health:

GENTLEMEN:—I herewith submit a condensed report for the two years ending September 30, 1912.

Few changes have been made in the health department during the two years just passed. Richard J. Lawton, M. D., of Terryville, succeeded Dr. A. V. Stoughton as Health Officer of Plymouth owing to the removal of the latter to California; Frank P. Marble, of New Hartford, was appointed Health Officer to succeed Dr. J. Swett, resigned; Dr. James H. Kane was appointed Health Officer in Thomaston to succeed Dr. Hassard, whose ill health rendered his resignation necessary; while in Torrington, Dr. George Streit was appointed to succeed Dr. Elias Pratt, resigned. All other Health Officers have been reappointed at the expiration of their respective terms. The power to make temporary appointments, and the exercise of such power occasionally has relieved the Health Officer at times, and given him greater freedom, without prejudice to his work. The details of the work of the local Health Officers will, of course, be found in their own records and in the brief reports made by them.

Co-operation, assistance and advice form a considerable part of the work of the County Health Officer. Better local sanitary conditions, and co-operation in such matters, has been sought, rather than punishment and creation of friction, because of technical violations, but willful violations have been treated as deserved.

Typhoid made its appearance in Torrington to an unusual extent in the early part of September, 1911, and soon developed into a most disastrous epidemic, there being more than three hundred and fifty cases—quite a number resulting fatally. The local Health Officer was given the

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very active, personal assistance of Prof. Newlands and of other representatives of the State Board of Health, and all together made strenuous, persistent and effective efforts to crush out the epidemic. That the cause was due to the milk supply was quickly shown to be impossible—the disease was too widespread and it would necessarily have involved all dealers. Extreme precautions were taken in the care and distribution of the food supply. It soon became apparent from an analysis of many samples of water from the reservoirs of the local water company, that in some manner the water was the cause of the trouble. The watershed was thoroughly investigated, but no evidence of typhoid could be found there. Notice was given to all, to boil all water used and cook all food, and all typhoid cases were strictly quarantined. Under the advice of Prof. Newlands the water was treated with chloride of lime—a disinfecting plant having been established for that purpose. The epidemic has been reported in greater detail by both the local Health Officer and by Prof. Newlands. Too much credit cannot be given to those who labored so faithfully and persistently to subdue and control this disease which had so suddenly plunged the people of Torrington into a condition of gloom. The doctors and nurses (of whom there were more than eighty), gave their best, and their efforts and success should be most greatly appreciated, while all Torrington returns its most grateful thanks to the officials and members of Trinity Parish who, with the neighboring hospitals overflowing and a great need still existing, with true Christian spirit, proffered their parish house to be used as a hospital for the relief of the afflicted, also to those who so generously subscribed to the relief fund.

While smallpox was so prevalent in Naugatuck anxiety existed lest the disease spread up the valleys of Litchfield county. A few cases developed at Greystone, a little settlement in the town of Plymouth, on the line of the Highland Division of the N. Y., N. H. & H. R. R. The local Health Officer gave up his practice, and devoted his entire time to the care of those patients and to the prevention of the spread of the disease. No other cases developed. Also during this period, precautions were taken to prevent the possible spread of the disease by large gatherings of people from infected districts to witness or take part in public sports in uninfected localities.

Have approved many applications for analysis of samples of water, where there appeared to be reasonable grounds to fear that the public health might suffer from contamination. Have co-operated with the State Bacteriological Laboratory in securing through the local Health Officers samples of milk from dealers in the various parts of this county. I would suggest that the certificate given by the person in charge of the Laboratory showing the results of the milk analysis be made by law prima facie evidence of the facts alleged therein giving it similar effect to the certificate from the Agricultural Experiment Station.

The purity of the water from our lakes and ponds where ice is cut, or water taken for drinking or culinary purposes has received attention, particularly at Bantam Lake and Lake Waramaug. Most of these efforts have been fairly met. One willful act at Bantam Lake, where Mr. Cashman, in September last, siphoned the entire contents of his cesspool (including water closet) into the lake not far from the point where water is taken for use by a number of families, is now receiving attention.

The attention of the Health Officers was called to the various new laws pertaining to their duties, passed in 1911, particularly the ones relating to the use of public drinking cups and distribution of free antitoxin. Many changes were made in the methods of supplying school children with water.

The tenement house law affects only three boroughs in this county,

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and I have taken up the same with the Health Officers of those sections.

In various isolated instances the establishment of sewers for the accommodation of particular sections has done away with annoying conditions of long standing. In the borough of Winsted the subject has received serious attention, but no definite results have been reached, though progress has been made there along kindred lines, that is, securing a system of garbage disposal. Watertown is another community greatly in need of a sewer system, and the matter has been systematically taken up to secure information, etc. Public meetings have been held, at which various members of the State Board of Health and the County Health Officer have been present. Committees have been appointed to look more carefuly into the situation and considerable interest and desire shown to get rid of the long standing nuisances which are a blot upon that locality, and a menace to the health of its inhabitants. The solution of these problems is not easy, and it will be expensive, but some solution soon is an inevitable necessity. In the town of North Canaan, the establishment of sewers some time since has been of great benefit to the place. Extensions of the system wherever feasible, so as to include sections greatly in need of sewers, in the interest of preserving the public health, is most earnestly urged.

One reported persistent violator of the "bob veal" law, operating a slaughter in Morris, was prosecuted and he paid fines and costs on six charges. Laws relating to the reporting of contagious diseases and quarantine have been sustained by prosecutions. The attention of many milk dealers has been called to illegal sales of their products, and prosecution has followed inattention to such notices. Investigations have been made of alleged violations of the medical practice act.

The establishment of a large camp of Italian laborers in the bed of the new Waterbury reservoir, in the town of Morris some years ago, and its retention there until late in the fall of 1911, was the cause of some anxiety, as it was feared that in large freshets the grounds would be flooded and the protecting ditches rendered of little value. Such a freshet did occur in the fall of 1911, the water covering all ditches and rising above the floors of the main buildings; happily no typhoid had existed there and no evil consequences are known to have followed.

The school buildings have also received attention, thorough cleansing and fumigation having been required wherever contagious disease has existed. The water supplies connected therewith have also been looked into as additional safeguards.

Securing the first names of children, the binding and indexing of birth, marriage and death certificates as fast as enough have accumulated, and full accurate and prompt return, in black ink, of all vital statistics have been insisted upon in the various towns. In these respects most of those charged with the duties have been reasonbly proficient.

There has been no appeal from the orders of a Health Officer. Cooperation has been hearty, and assistance by members of the State Board of Health has been promptly and efficiently given when requested. Valuble information has resulted from the various conferences, which has enabled all who were able to attend, to accomplish better results.

Respectfully submitted,

FRANK W. ETHERIDGE,
County Health Officer of Litchfield County.

MIDDLESEX COUNTY.

To the Honorable State Board of Health:

Pursuant to the requirement of the statute, I herewith present a report

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of my doings as County Health Officer for Middlesex county, for the biennial period ending September 30, 1912.

The routine work of the office varies but little from year to year; during the period covered by this report, little outside the ordinary routine has required attention. The complaints which have been brought to my attention have been investigated and such suggestions and advice given as seemed best to solve the difficulty; the work of the several Town Health Officers has been supervised and such advice as they required has been given; these, with the examinatiton and approval of Health Officers' bills and the inspection of returns of vital statistics have comprised the greater part of the work.

A considerable number of applications for analysis of water by the State Laboratory have been received and approved. In every case the suspected water was from separate and private wells or springs, and before approving the applications, the Health Officers have been required to show good cause for suspecting the water to be a menace to the health of the community or the source of existing contagious disease.

Two instances of public water supplies have been brought to my attention and have been under consideration for some time. In both cases there is need of improvement in the sanitary surroundings and character of the water. Both offenders are corporations; in the case of one it is probable that application will have to be made to the court; in the other it is expected that the trouble will be remedied without resort to such measures.

In all cases of impounded water for community uses, secured for the most part from surface drainage, there is the question to be considered as to what extent, if any, a water company, having acquired the lower land and relying upon the drainage from higher land belonging to other owners, can require of the adjoining owners a use of their land differing from the ordinary use; whether, under the police power of the state, the adjoining owners may be restricted in the use of their lands to such purposes as will not affect the character of the water flowing over such lands into the water company's reservoir, or whether, if such restricted use is necessary to prevent polluton of the water, the water company should not be required to make due compensation.

Complaints have come to me from two towns, of the nuisance of unloading stable manure, in these cases from freight cars, during the summer months. I understand that these shipments at this time are accounted for by the fact that during these months the regulations of New York city compel the removal of the manure from the city immediately. This results in its sale at a much lower price than obtains in the other months when it could be handled with much less discomfort to the communities into which it is sent. Since the passage of Chapter 201 of the Public Acts of 1905, taking from Town Health Officers the power to regulate the handling of fertilizers, the only way to reach the difficulty is under the general powers of such officers in each specific case and this is inefficient. The best that can be done is to secure a speedy unloading and so get rid of the nuisance quickly.

The several Health Officers, whose terms expired during the two years, have been reappointed. The Health Officers of this county have been faithful and efficient, and have heartily co-operated with the State Laboratory in its work of milk investigation.

Respectfully submitted,

W. U. PEARNE,
County Health Officer, Middlesex County.

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TOLLAND COUNTY.

To the Honorable State Board of Health of the State of Connecticut:

I hereby respectfully submit a report of my doings as Health Officer for Tolland county as required by law.

The work of my office has not been greatly different from that of former years, although the volume of work is on the increase.

There has been only one change among the local Health Officers, Dr. E. T. Davis, Town Health Officer of Ellington, having died, and Dr. E. A. Brace having been appointed to succeed him.

There have been no serious epidemics in the county. An outbreak of smallpox in Willimantic and other Windham county towns adjoining our county caused a great deal of anxiety, but only one case was reported in the county, in the Town of Mansfield. Orders were issued by the Health Officers of many of our towns forbidding children to attend High School in Willimantic unless they had recently been vaccinated. This rule was violated in two instances and I brought injunctions in these cases to restrain the parents of the children from violating the order. No orders for general vaccination were issued, but a great many people were vaccinated without such order.

Complaints have come to me regarding nuisances, which might pollute waters used for drinking supplies, all of which have been investigated and a number of nuisances have been abated. The City of Willimantic draws its drinking water from the Natchaug River, which receives a great deal of its water from our county. Nuisances were investigated for about fifteen (15) miles above the reservoir, in conjunction with the Secretary of the State Board of Health and the County Health Officer of Windham County. We were of the opinion that certain sources of pollution, which were nuisances in no other sense than that they might possibly contaminate this water supply, could not be abated by the local Health Officers at the expense of the towns, but must be taken care of by the water company at its own expense. The Rockville supply at Snipsic Lake was also thoroughly inspected and many nuisances which might possibly contaminated it have been abated. At West Stafford water taken from a pond has formerly been used for drinking purposes, but as many sink drains and cesspools empty into the stream a short distance above the pond, I advised that its use be discontinued for drinking purposes. This stream runs through the village of West Stafford, many of the houses being right on its banks and all the drainage of the village being naturally into this stream so that it seems impossible to make it a safe supply even if no drains were emptied directly into it.

The vital statistics of the county are in very good condition, reports being much more complete and prompt than in former years. Most of the towns have bound their certificates, which is a great improvement. A good many of the foreigners do not employ physicians when children are born and I find that a great many births among this class fail to be reported to the town clerks. I have taken steps so far as possible to get these births reported and a good many of them are now on record.

No violations of the medical practice act or the law relating to the sale of poisons have come to my attention.

The local Health Officers and Registrars are all interested in their work and are doing everything in their power to improve conditions in the county.

The State Board of Health have shown themselves anxious to co-operate in every way and I feel that conditions at the present time are very satisfactory.

Respectfully submitted,

E. M. YEOMANS,
County Health Officer.

Andover, Conn., October 1, 1912.

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THE REPORTS OF THE LOCAL HEALTH OFFICERS

The town, borough and city Health Officers of the State have nearly all made the annual report of their doings to the State Board of Health, as required by law. These reports give a clear and concise account of the sanitary condition and health of the various towns, and it is regretted that the limit placed upon the size of this report prevents their publication.

The following are published as showing the general character of these reports or for the reason that they relate to matters of particular interest.

REPORT OF THE HEALTH OFFICER OF DARIEN FOR 1911.
DR. G. H. NOXON.

To the Connecticut State Board of Health:

I herewith submit the annual report as required by law.

There has been no serious epidemic of any of the infectious diseases and although there were a large number of cases of measles the type was mild.

There were seven cases of scarlet fever reported, two of diphtheria, seven of whooping cough, three of consumption, one of typhoid fever and eighty-five of measles.

One of the cases of scarlet fever occurred in the family of an Italian; it was found that they were not observing the quarantine and visitors came and went at their pleasure regardless of orders. This necessitated the placing of officers at the house to stop them and prevent the further spread of the trouble.

The State Laboratory has examined a great many specimens for the diagnosis of tuberculosis, diphtheria, typhoid fever and malaria. In connection with this a number of times during the year milk has been sent. This has been done at times unknown to the dealers and tends to make them more careful in the handling and delivery of the milk.

A number of specimens of water have been sent for analysis, some of which taken from wells in the center of the town, showed contamination by sewage. The water service now being installed in the town will be a blessing to a great many people, but it must not be forgotten that people who take this water will still have wells on their premises, and these, unless they are filled or carefully covered after they are abandoned, will become sources of nuisance in time and will also make good breeding places for mosquitoes unless properly screened or covered.

There were a few complaints of nuisances which were regulated without difficulty. The order restraining the railroad company from bring-

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ing manure on the cars into the town from May to October has prevented the nuisance which has been so annoying in summers past. Commencing in October they will begin to bring it again and an effort is being made to have it unloaded outside the town.

Owing to the mosquitoes which have been so plentiful we have had an unusually large number of cases of malarial fever this year. There is an effort on foot under subscription to drain all the swamps along our shore front by cutting a deep trench from these pools to tidewater, thus allowing the water to flow in and out with the tide, for it is in these small stagnant pools of salt water where ninety per cent. of our mosquitoes are propagated. The expense of draining these marshes is defrayed by private subscription, the town contributing three hundred dollars, which is the amount that can be expended in any one year, according to an act of legislature for the drainage of swamps detrimental to the public health. This work is going on at the present time. Where this has been done on Long Island and in New Jersey the benefits have been apparent at once and the wonder is that it should not have been thought of before. If the state would take up this work in a systematic manner a great deal of good might be accomplished.

The schools have been inspected and are sanitary. The new school building is a credit to the town. This and the new water supply is evidence of progress.

REPORT OF THE HEALTH OFFICER OF MERIDEN FOR 1911.
DR. L. F. WHEATLEY.

To the Conneticut State Board of Health:

In accordance with the statute laws, I hereby submit my annual report for the year ending August 31st, 1911.

During this past year there have been reported infectious and contagious diseases, as follows:

Scarlet fever, 35 cases; diphtheria, 52 cases; measles, 142 cases; tuberculosis, 61 cases; typhoid fever, 11 cases; infantile paralysis, 2 cases.

Measles were prevalent in an unusual degree from January to June of this year, in spite of rigid inspection and wholesale exclusion from school. I think this was due in a large degree to the equanimity with which parents view this disease, taking no precautions and not calling in medical attendance unless complications arose. Fortunately, this disease was present in a mild form, very few deaths being attributed to it.

Scarlet fever and diphtheria prevailed to about the usual extent.

Several "near" epidemics of scarlet fever, five or six in a locality, were traced to an unrecognized or neglected case which was allowed the free run of the neighborhood while actively peeling. Prompt quarantining of these cases checked the further spread of the disease. I have been impressed with the contagiousness of the invasion of the disease from the secretions of nose or throat at the onset, in several instances, and I feel that we should regard this period of the infection with as much concern as the period of desquamation.

Recognizing the importance of the diphtheria "carriers" as a means of transmitting the infection in the schools, we are planning this year to take cultures from the pupils occupying seats in the immediate vicinity of any pupil contracting the disease, excluding them until reports on the cultures are received.

When two cases of either scarlet fever or diphtheria are reported in one room, we immediately dismiss the pupils and thoroughly disinfect and

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fumigate the room, paying as much attention to the mechanical cleansing of the desks, chairs, blackboards, erasers, pencils, etc. as to the fumigation itself.

This city is comparatively free from typhoid fever, only eleven cases being reported for the entire year.

No new cases of infantile paralysis have occurred since the epidemic of last year.

By means of the monthly report to the Common Council, a medium of communication to the public, a crusade against the flies was started early in the summer months. It was taken up enthusiastically by the papers. Special attention was directed to the breeding places, pointing out the importance of keeping garbage cans tightly covered, manure heaps abolished, or screened or sprayed with petroleum or kerosene, and stagnant water drained off, old tin cans containing water removed, windows and doors carefully screened, milk fully protected, flies kept away from the table and "swatters" freely used.

The Salvation Army offered a prize of $5.00 for the boy or girl killing the greatest number of flies in a given time, about two weeks, I believe. The winner killed over 30,000.

I think the public were pretty generally instructed and fully realized the dangers caused by the presence of flies.

We also inaugurated a "cleaning up" day the first part of May, setting aside one whole day for every one to clean up his back yard and deposit all refuse, rubbish of all sorts on the curb, all of which was collected at the city's expense. The public took hold of the idea with zeal and during the day appointed 152 two-horse loads, each load the size of a load of hay, were removed from the streets of the city.

I think that it helped materially to reduce the breeding places for insects of all kinds, and I shall endeavor to make this a yearly custom.

The medical inspection of schools was started last fall, three physicians and a nurse being appointed to visit the schools at regular intervals. It undoubtedly aided materially in keeping down the number of infectious and contagious diseases. Later in the year free dental inspection was also done.

During the year, the movement was started to build a contagious ward annex to the local hospital. We are greatly in need of a contagious hospital, but it met with such strong opposiion on the part of those in the immediate vicinity of the proposed building, that the movement was postponed for the time being.

The law enforcing sewer connections went into effect last June, and during this past year practically all houses were connected with the sewer. It was necessary in about a dozen cases, however, to fine them in Police Court before connections were made.

I think this had a salutary effect, as after each case was brought into court renewed activities were noticed on the part of delinquent property owners.

We have had the drinking cups in the public fountains, both in the city and parks, and also in the schools, replaced by a bubbling fountain arrangement, and hope to have the drinking cups in all the public places abolished soon.

AN EPIDEMIC OF TYPHOID FEVER IN SHELTON.

(From Annual Report (1911) of Dr. G. A. Shelton, Health Officer.)

Typhoid Fever—In the month of June, when all cases of illness are

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proverbially few, the borough was suddenly awakened to the fact that an epidemic of typhoid fever had settled in our midst. The first cases appeared on June 17th and others rapidly developed in different parts of the borough, until at its close there had been forty-one cases reported. Never before in the history of the borough, and probably in the history of the town, had such an epidemic of typhoid fever occurred. With our excellent system of sewers, and well guarded water supply, we had reason to expect none, from causes existing within our boundary, and yet exposures to contaminated water from outside localities are likely to bring to us some few isolated cases, during the late season of summer.

The character of this epidemic had no widespread feature, showing that the health of the whole population was endangered from one common cause, as would appear from the contamination of the public water supply. It was narrowed in its visitation, and the cause at once fixed upon the milk supply of one suspected dealer. All further distribution of this milk was immediately forbidden, and biological examination thoroughly made, at both state and private laboratories, to determine the true cause. In this investigation the borough and town Health Officers, with the milk inspector united in their work. The County Health Officer, the Secretary of the State Board of Health, and the State Dairy Commissioner, gave to us their personal interest and assistance, which resulted in locating beyond question the cause of the epidemic. It was discovered that a farmer who furnished from his dairy a large part of this dealer's milk for distribution, had in his employ a farm hand ill of typhoid fever, who in its early course, cared for the preparation of the milk. In this way the typhoid fever germs were carelessly and ignorantly communicated to the milk, which had its distribution within our borough, thus giving to us this large number of cases.

The full cost of such an epidemic cannot be estimated in the suffering of mind and body, together with the great expense of medical treatment and long continued nursing of these cases during the extended period of time, which typhoid fever most surely demands. Nearly all these families were illy prepared to meet this unexpected expense, and the borough authorities at once saw the exigency of the situation so suddenly thrown upon us, and immediately introduced at public expense a force of nurses sufficient to meet the demand. The District Nurses' Association also rendered its assistance in a few cases, and the extent of suffering thereby greatly lessened. Most of the cases were very severe, and yet we were indeed most fortunate in having only one fatal case to record. Too much of grateful recognition cannot be given the faithful physicians and nurses, who in their untiring devotion to the sick, relieved their suffering, and led them into their better days. The borough authorities in promptly meeting this situation, by giving unfettered assistance to the actve workers in the epidemic, deserve the thanks of the people for their patriotic efforts, in freeing from our midst this terrible destroyer of lives.

The assurance to the people that the fever need not pass beyond the limits of the milk distribution allayed all fear, and a very general assistance was freely offered.

The clouds of alarm have again passed away, and the lesson at great cost, which has been taught us—of watchfulness in our living, and care of our surroundings—should not be forgotten.

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REPORT OF THE HEALTH OFFICER OF BRIDGEPORT FOR 1912.
DR. EDWARD A. McLELLAN.

To the Connecticut State Board of Health:

I herewith submit the following report from the Bridgeport Department of Health, for the year ending August 31, 1912:

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	T't'l
Scarlet Fever—													
Cases	3	5	10	13	11	33	36	26	29	23	21	11	221
Deaths	0	0	1	1	1	2	5	1	2	0	1	0	14
Diphtheria—													
Cases	5	14	12	15	5	14	7	11	14	9	6	5	117
Deaths	2	1	2	4	1	1	1	0	3	0	0	2	17
Tuberculosis—													
Cases	2	17	13	21	9	12	7	16	15	12	22	12	158
Deaths	7	6	10	14	4	6	7	10	16	10	10	8	108
Pneumonia—													
Deaths	4	9	11	19	21	26	28	18	16	10.	11	11	184
Typhoid Fever—													
Cases,	2	5	2	2	1	0	0	1	11	0	3	3	30
Deaths	0	1	0	1	0	0	0	0	3	0	1	0	6

Number of deaths for the year ending Aug. 31, 1912—1,413
Number of deaths for the year ending Aug. 31, 1911—1,524
Deaths of children under five years of age in 1912— 430
Deaths of children under five years of age in 1911— 479

A reference to the statistics will show that some of the communicable diseases were more numerous than in 1911.

They will also show that in the month of May there was a sudden and an unusual increase in typhoid fever reported. About the middle of April, twenty-three young ladies attended a luncheon of the Kappa Phi society, and about the first of May, four of these ladies developed typhoid fever.

At a dinner given about this same date, the middle of April, at a private home, made up of a party much smaller than the young lades' party, three of the persons partaking of the dinner became ill with typhoid fever. On investigation, it was learned that on both of these occasions raw clams were eaten. A further investigation revealed that the clams for both occasions came from the same dealer. Some of the dealers in sea foods in the city at times buy clams procured locally and not far from the outlet of sewers.

About this time, a young lady in a private family eating freely of clams procured in the city, developed typhoid fever. The report of these cases was given through the local press, and the public warned against eating raw sea food. No further cases developed.

Of the other three cases reported for the month, two of them were traveling men and of the other, the diagnosis was questionable. The table will show that for the remainder of the year the disease was unusually light. This department awaits suggestions from the State Board of Health as to the proper control of the sale of clams and oysters procured near the city.

A mild form of scarlet fever prevailed throughout the year. It was difficult to control because of its mildness, physicians not being called by families having cases of the disease. Its existence in many cases was only discovered through the vigilance of school teachers, the school nurse or school physician.

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The school physician and school nurse are valuable additions to the health department. Besides the detection of communicable diseases among the children, an effort is being made by them to secure the removal of physical defects which lessen the ability to pursue the school studies and which if allowed to remain, often handicap in life's struggles. Through these agents, pupils are always instructed in hygiene, the benefits of fresh air, the relative value of foods, and in sanitary laws referring to the care of household refuse, etc.

During the school vacation, the nurse inspects the birth certificates and visits the families where the new baby has arrived, and in suitable cases gives advice to the mothers and leaves printed instructions on the care of babies.

Bridgeport water supply is ample and of good quality and the hydraulic company is ever alert to prevent its contamination. Our ice supply is usually above suspicion.

There is nothing new to write about the garbage. It continues to annoy, although in a less degree than formerly, householders living in the vicinity of the reduction plant. Its disposal by burning can be carried out with satisfactory results.

REPORT OF THE HEALTH OFFICER OF FAIRFIELD FOR 1912. DR. W. H. DONALDSON.

To the Connecticut State Board of Health:

The report of the Town Health Officer for the past year is very similar to those of recent years. There have been no epidemics of disease and little has occurred to call for special notice. The general health of our people for the year has been excellent. There has been a very exceptional freedom from sickness, especially of the usual summer intestinal diseases.

During the year there were only 34 cases of contagious diseases of which 28 (the same as in 1911) were of a mild form of measles. Not a case of diphtheria was reported and only one of typhoid fever, and five of scarlet fever, of a mild type. This is a remarkable record for a town of this size and character. There were a number of cases of whooping cough, but it is impossible to get it reported.

As a natural sequence of the foregoing there was an extremely low death record—only 68—giving a death rate of 10.6, much the lowest in many years. That of the state at large was similarly low—14.8. Nine of our residents died out of town.

In keeping with the foregoing we had the largest number of births ever recorded in town—73 males and 70 females—a total of 143.

This is an increase of 14 over last year and decrease of 22 in deaths. You will observe that the number of births have nearly doubled in the past few years.

Twenty complaints have received attention, viz: Cesspools, 8; privies, 6; dead animals, 1; fowls, 2; general nuisances, 3.

The inspection of the milk sold in town has been continued by the State Laboratory with quite satisfctory results. Milk from two sources of supply were found to be rather poor, but generally the supply has been good.

The sanitary condition of the school buildings is fair, the greatest defect being the outhouses. It is very difficult to secure the proper care of these by the janitors.

The large number of people summering upon the beach requires more attention each year. During the past summer an assistant was employed to look after this section, and also the matter of privies and pigpens, with

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good results. Many of our people need instruction as to the danger of filthiness in these adjuncts of the home. The past two summers a sanitary circular, also one on flies, issued by the State Board of Health, have been distributed with evident profit to the community.

Each year the urgent need of sewers becomes more apparent in the more thickly settled parts of the town. You are reminded that all recommendations on this important matter have been ignored by the town. It is a problem that must soon be seriously considered.

A very difficult problem has arisen in the Holland Hill district where several real estate projects have caused the building of houses on very inadequate sized lots. The owners have tried to work out the impossible feat of water supply, sewage disposal, privies, horses and cow stables, chicken yards and pigpens on lots of 25x100 feet.

The attention of the citizens of the town is called to the acts of certain promoters of real estate schemes in thus laying the foundations for future trouble for the town. It calls for immediate regulation.

A most important, though long delayed, work has been accomplished in draining the marshes for the purpose of getting rid of the mosquitoes. This has been done by private subscription under the direction of a committee of citizens to whom we are greatly indebted for the carrying out of this large task. The responsibility now rests with the towns to see that the benefits are secured by careful supervision each season. To this end a sufficient appropriation should be made every year to maintain the work. It affects the health of every resident. Already much improvement has been noted but the full results will be more evident next season.

The very ready and efficient co-operation of the town officials and residents generally is greatly appreciated and hereby duly acknowledged.

REPORT OF THE HEALTH OFFICER OF GREENWICH FOR 1912. DR. A. W. KLEIN.

To the Connecticut State Board of Health:

During the year ending August 31st, 1912, there were reported infectious diseases as follows: Smallpox, 0; measles, 212; scarlet fever, 39; cerebro spinal fever, 1; diphtheria, 12; whooping cough, 18; typhoid fever, 16; pulmonary tuberculosis, 12; infantile paralysis, 4.

Measles was epidemic during the months of February, March and April. Since June only one case has been reported.

Scarlet fever has been present in very much lessened degree and is still of the very mild type. There were no cases reported in August and at this writing there are no known cases in town.

Diphtheria has been noted in the usual numbers to be expected and the cases have been well controlled by the antitoxin treatment. The State furnishes the antitoxin for treating actual cases and the immunizing doses for those exposed and this has no doubt served to prevent spreading of the disease.

Typhoid fever cases to the number of sixteen were reported, of which five occurred in September and October, 1911. During the summer months the majority of the remainder occurred. The cases were scattered and could not be traced to any common source of infection. In fact, most of the cases were in persons who contracted the disease elsewhere. Two cases were probably due to the very unsanitary home conditions.

Malaria has been present in alarming degree during the past year and calls for speedy and radical relief. It is a preventable disease and the drainage of mosquito breeding places and the establishment of proper

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sanitary inspection of premises is imperative. Steps should at once be taken to pass a law whereby the draining of swamp lands, etc., could be enforced by the Health Officers. The Board of Trade has started a movement to obtain funds wherewith to drain a limited area and private citizens of Sound Beach have undertaken a similar movement in that section.

The water supply has been excellent in quality and the increased storage facilities have insured ample quantity.

Milk—The supply is ample and of good average quality. The repeated examination of specimens taken at irregular intervals does much to keep up the standard, but systematic inspection of dairies is much needed.

The Sewer Commission is making some progress toward establishing a sewage disposal system and the need for sewering is much felt. Until it is established the abatement of nuisances from soil and stream pollution cannot be properly maintained.

After repeated efforts an attempt is to be made to obtain funds to provide improvements in the Bruce Park Lakes, which will render them more sanitary and free the town of one of its mosquito breeding places. Flood gates are to be provided and the pond near the bridge is to be filled, if the necessary appropriation is made as requested.

Glanders was very prevalent during the beginning of the fiscal year and the Board of Estimate appropriated, at the request of the Health Officer, $500.00 with which to work.

Dr. Earl Scoleld was appointed the local deputy by Commissioner of Domestic Animals, General Averill, and by closing public fountains, isolation and destroying of infected animals, fumigation of premises and frequent inspections, the disease was practically wiped out.

Rabies was very prevalent and the Commissioner of Domestic Animals, at the request of the Health Officer ordered all dogs to be muzzled. This order the selectmen enforced through their dog warden and the number of cases of rabies has been markedly lessened.

The examination at the State Laboratory showed in eight instances the presence of rabies. Two individuals were bitten by rabid dogs and were given Pasteur treatment with successful results.

The muzzling of dogs should be made a state rule and if the dog wardenship were made a salaried position the enforcement of the law prohibiting dogs from running loose and unmuzzled could be made more effectual.

The need for new and better school buildings in various sections of the town is well known and should be remedied. Some of the buildings are insanitary in themselves or in insanitary locations and nearly all are overcrowded.

Nuisances have been abated as far as possible but with the lack of facilities for constant inspection, this cannot be done with best results, and for the same reason, milk production and plumbing are not regulated as they should be.

The crying need for a force to aid the Health Officer in these departments has been called to the attention of the public repeatedly. It will be the aim of the Health Officer to obtain funds to develop a departmental force along these lines and an effort will be made to establish a Health Board and the public is earnestly asked to aid so that many of the present unfavorable conditions in our town may be eliminated and public health better safeguarded.

REPORT OF THE HEALTH OFFICER OF TORRINGTON FOR 1912. DR. GEORGE STREIT.

To the Connecticut State Board of Health:

I herewith submit the following report of the year ending August 31,

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1912. There occurred during this year twenty cases of scarlet fever, seventy-eight cases of diphtheria, eighteen cases of measles, and three hundred and fifty-one cases of typhoid fever, some twelve cases of tuberculosis have been reported. The diphtheria cases occurred mostly during the months of September and October, during the time of the typhoid epidemic. For a time it looked as though we might have an epidemic of this disease, but a very strict quarantine was put upon all cases and thus the epidemic was averted.

Some of the money raised for typhoid relief was used to furnish free antitoxin for diphtheria.

One hundred fumigations were done, including nineteen for tuberculosis. Forty nuisances were investigated and abated. This does not include work done by the police during the typhoid epidemic, a large number being cared for by them.

Ten houses have abolished outhouses and connected with a sewer. Three broken sewer pipes repaired and two large swamps filled in.

Of the typhoid epidemic I shall state only briefly a few facts as Mr. Newlands, the state chemist, has already published a full account. During the month of August there were three cases of typhoid. This was not an unusual number of cases and nothing was thought of it. In the first week of September reports of several more cases came in, but were comparatively small in number and did not occasion any alarm. When, however, during the second week of September, several cases were reported daily, suspicion of an impending epidemic was aroused. The first thought was of milk infection. Upon investigation it was found that about all the milkmen would be involved if this were the source, and this being practically an impossibility, the water supply was next looked to. On September 14th I went over to the watershed, but was unable to find any evidence of typhoid on, or having been, on the watershed.

Samples of water from Marshall Lake and Crystal Lake were sent to the State Laboratory, Dr. Townsend was notified and Mr. Newlands was sent to help locate the source of infections. Notices were published in the papers warning all to boil the water and thoroughly cook all foods.

On the evening of September 16th a meeting of the borough board, the physicians, and a committee representing the manufacturers' association, was held. Steps were taken for the relief of the sufferers, something over thirty thousand dollars was raised by public subscription. Neighboring hospitals were rapidly filled, eighty nurses were brought from several cities and sent to the homes of those afflicted.

It was soon realized that a hospital would be necessary and Trinity parish house was offered. It proved admirably adapted for this purpose, and one hundred and twelve cases were cared for there, with but eight deaths.

In the meantime, at the advice of Mr. Newlands, a chloride of lime disinfecting plant was established by the water company and this method of treating the water has been kept up since the beginning. As a result of this investigation it was found that the water had been infected, all other sources being eliminated.

Since the abatement of the epdemic, there have been but thirteen cases.

All houses having outhouses where cases occurred were thoroughly disinfected in the fall and spring.

In regards to typhoid vaccination I wish to say, that as the nurses arrived and went on duty, they were advised to be vaccinated. About half of them took this advice and were vaccinated. Of those who were not vaccinated, four became infected; this seems to me a very important point and I believe of enough importance to warrant the use of the vaccine.

During the spring quite a number of vaccinations were done by the local physicians. Through the summer all markets and stores were warned not to expose food outside the buildings and this rule was very well kept.

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The public schools have been inspected and necessary repairs referred to the Board of Education.

SMALLPOX IN NAUGATUCK.

(From Annual Report of Dr. Walter A. Reilly, Health Officer.)

SMALLPOX.

On Sunday, March the 24th, 1912, smallpox was discovered in our borough. Immediately upon learning this, the borough authorities set to work to adopt measures for combating the disease. Meetings were called of the different boards constituting the government, and of the physicians of the borough, and plans were laid for a vigorous fight against our unwelcome visitor. Experts were called in to allay the doubts of the people, to assist in the diagnosis of cases and to help us by their counsel and advice. At the time of the appearance of the first few cases there was, and had been for some time previous, an epidemic of chickenpox in the borough, and upon investigation we found a large number of supposed cases of varicella to be in reality mild cases of variola. Hence, the exposure was great, and as expected the number of cases kept constantly increasing for the first few weeks.

The old discarded hose house on Water street was seized upon in the emergency and fitted up as an isolation hospital and proved to be a great aid in the suppression of the epidemic. The board of education voted to extend free vaccination to the school children, and the board of warden and burgesses, not to be outdone in the good cause, offered free vaccination to all who felt that they were unable to pay for the same themselves.

Worthy of note is the fact that the board of education advisedly took no vote, ordering the closing of the schools; this latter course, as far as I know, was unprecedented and proved to be of inestimable value to those engaged in fighting the epidemic. The superintendent of schools daily sent me a typewritten list of all absentees, and also all the information gleaned from the pupils as to the houses in which chickenpox was reported to have been. Information was received from the foremen in the factories regarding hands absent from work. The physicians were instructed to report immediately all cases of chickenpox that came to their notice, and also all cases of suspicious skin eruptions. It will be seen then that we had several valued sources of information for the detection of cases and the most valuable was the daily school list, for by it we were enabled to locate many cases, besides keeping a strict supervision over a large percentage of the population of the town.

The method of quarantine adopted was as follows: Upon the discovery of a case the patient was either isolated in the home, and the house quarantined, or he was removed to the isolation hospital; the other members of the family were vaccinated, and in case of removal of the patient to the isolation hospital, the house was fumigated. Those vaccinated were required to report daily to the Health Officer until such a time as the vaccination was shown to be successful.

The total number of cases reported was 193. The cases were in the main mild in character, and though some were severe, none could be termed malignant. The period of quarantine varied from two to six weeks.

VACCINATION.

The vaccination record of this epidemic will be of especial interest as showing conclusively on a small scale, the protective value of vaccina-

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tion against smallpox. Number of cases, 193; of this number those not vaccinated number 157, while the number of patients who had been successfully vaccinated was 36. Thirteen of the latter were vaccinated after smallpox had existed in their homes from one to three weeks, during which time they had been directly exposed to the disease. The remaining twenty-three had been vaccinated from twenty to fifty years preceding the date of the present epidemic. To summarize:

The predisposing cause of our recent epidemic was the same as for all epidemics of smallpox, namely the lack of proper protection by vaccination. The proximate cause could not be established except in a general way. Having an epidemic of chickenpox in the borough, a case of smallpox developed and propagated a number of mild cases of the disease, which were unrecognized until a case developed severe enough to require the continued attention of a physician, when its true nature was discovered.

CONCLUSIONS.

The help given me towards the suppression of the epidemic by the State Board of Health, as represented by Dr. Townsend, by the County Health Officer, Mr. Hoadley, by the borough authorities, by the school authorities, by the physicians, and, in fact, by the people of Naugatuck in all walks of life, contributed largely towards a successful issue of our labors, and was duly appreciated by the Health Officer.

Vaccination, I believe, proved to be our greatest weapon, with isolation as a good second. We physicians, being entrusted with the care of the public health, should continually keep before the people the great protective value of vaccination, not only in the epidemic period, but also in the inter-epidemic period. Every town should have for an emergency a properly equipped isolation and detention hospital. In the face of another epidemic or an outbreak of smallpox, in the light of my recent experience, I believe I should say, "Keep the schools open," provided, of course, one might have the necessary co-operation of the school authorities, which it was my good fortune to enjoy.

One more point that the epidemic seems to have brought out, is the importance of the physicians reporting to the Health Officer all cases of contagious diseases promptly, the mildest as well as the most severe.

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LABORATORY OF THE STATE BOARD OF HEALTH

REPORT OF THE DIRECTOR.

The period covered by this report extends from October, 1910, to October, 1912. During the first year, the appropriation for the maintenance of the laboratory was $7,500.00 and during the second year, $8,000.00 for the year. Of this, $5,400.00 has been devoted to salaries of the laboratory staff, the remainder being used for maintenance.

Laboratory Staff:

Director and bacteriologist—H. W. Conn.
Chemist—James A. Newlands.
Assistant bacteriologist—W. P. Bliss, one year; F. Lee Mickle, seven months, and R. B. Story, five months.
Assistant bacteriologist for milk work—Lena R. Potter.
Assistant chemist—T. R. Lathrop, nineteen months; F. Lee Mickle, five months.

The assistant bacteriologist has been changed twice during the period and the assistant chemist once. The appropriation for the support of the laboratory is insufficient to enable us to offer a salary to assistants, that will keep them for any considerable length of time, being only enough to enable us to obtain the services of recent graduates who are practically sure to leave us for better positions as soon as they become trained to our work. This necessity for a constant change is unfortunate for the greatest efficiency of the laboratory, but with the appropriation in our hands and the amount of work that we have to do, it is inevitable. The work of this laboratory could be made much more efficient if it were possible to pay assistants a salary sufficient to keep them for several years, but this has been impossible.

ROUTINE WORK.

The routine work of the laboratory has been constantly increasing since its start in the year 1906. When the laboratory was first opened, it was expected to be called upon only for examinations of tuberculosis, typhoid fever, and diphtheria. The six years that have passed since the opening of the laboratory have been years of extremely rapid expansion in the laboratory side of bacteriology, the world over, and each year has seen new laboratory methods developed which have proved to be of practical value in the control of infectious diseases, and the regulation of public health. New methods of laboratory diagnosis have been yearly perfected and as these methods have been found to be practical, they have been adopted by one after another of the bacteriological laboratories in this country as well as abroad, and, where we have been able to do so, our own laboratory has naturally undertaken these new kinds of diagnostic work. We do not as yet, however, make all of the examinations which are frequently, and, indeed, customarily made in bacteriological laboratories of public health boards, but the requirements placed upon us

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are increasing every year, both as concerns the variety of the work that we are called upon to do and the number of specimens which we are expected to examine and diagnose. This has caused a rapidly increasing amount of work to be thrown upon the laboratory as is clearly shown by the following table:

TABLE I. SHOWING WORK OF LABORATORY SINCE ITS BEGINNING.

	Tuberculosis	Diphtheria	Typhoid	Malaria	Rabies	Glanders	Milk	Water and Sewage	Miscellaneous	Total
1906*	443	269	146					83		941
1906-7	901	845	383		47			110		2,286
1907-8	1,087	880	528	86	40		974	390	57	4,042
1908-9	1,544	2,238	523	93	13		1,178	452	53	6,094
1909-10	1,764	4,129	606	110	10		2,517	470	52	9,658
1910-11	1,649	2,774	783	103	19	6	3,576	574	58	9,542
1911-12	1,619	3,185	833	108	39	317	4,142	472	68	10,783
Total	9,007	14,320	3,802	500	168	323	12,387	2,551	288	43,346

*Nine months.

The above table shows that the number of specimens which the laboratory has had to examine has been 25 per cent. greater in the last two years than the previous two. The real increase in the amount of labor, however, is not indicated by the table. Some of the new kinds of work which have been introduced in these years are very time consuming, far more so indeed than the individual samples that have been examined in previous years. For illustration, it will be seen from the above table that the number of specimens examined for diphtheria has remained in the last two years practically the same as the previous two years, there being, indeed, a few hundred less in the last period than in the first period. The examination of diphtheria specimens, however, takes the smallest amount of time of any of the kinds of work done in the laboratory. On the other hand this last year has seen a very great increase in the number of specimens of milk examined and also the introduction of the test for glanders, which in the ten months of the last year has called for 317 diagnoses. The test for glanders is a tedious one and requires a large amount of time, and this number of glanders specimens, therefore, in the amount of attention taken requires very much more laboratory time than three or four times this number of diphtheria samples would demand. The analysis of milk also is time consuming, for each milk analysis evolves four separate determinations. The fact, therefore, that the increase in specimens has been due chiefly to the work upon milk and glanders makes the above table somewhat misleading, for the increase in the requirements upon the laboratory staff is very decidedly greater than would seem from the numbers in the total column of examinations, if they are considered alone. This large amount of laboratory work required has made it practically impossible to have any research work carried on in the laboratory, as has been done in previous years.

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It is practically certain that the demands upon the laboratory during the next two years period will be increased over the past. Not only are the numbers of specimens constantly increasing, but requests are already reaching us for examinations upon other lines of work for which we have hitherto not been equipped and which we have not been prepared to do. Many requests reach us for aid in making ordinary pathological diagnoses; but these are universally refused, on the ground that the function of the laboratory is for the purpose of aiding Health Officers in controlling public health, rather than to aid the physicians in individual diagnoses. Other requests, however, such as those for examination for venereal diseases, appear to be a perfectly legitimate work for the laboratory of this sort; but hitherto, it has not been feasible to undertake these tests and up to the present time, we have been obliged practically always to refuse them. As will be seen in the following pages, we have occasionally made tests for gonorrhea, but hitherto examinations for syphilis have not been made because we have not had proper facilities for carrying them out. It is inevitable that the work of the laboratory will in the future, increase in scope as well as in number of specimens. In these days of the rapid development of laboratory methods, it is unsafe to predict what new work may be thrown upon us; but it is perfectly sure that the demand will increase with each year, as the physicians in the state learn further of the usefulness of laboratory methods in enabling them to handle and control infectious diseases.

The details of the routine work of the two years has been as follows:

TABLE II. SUMMARY OF WORK FOR THE PAST TWO YEARS.

1910-11	Tuberculosis	Diphtheria	Typhoid	Malaria	Rabies	Glanders	Milk	Water and Sewage	Miscellaneous	Total
October	125	188	108	4	1		210	36	4	676
November	130	459	86	5	1		245	41	4	971
December	127	658	47	6	1		212	48	5	1,096
January	144	203	51	4	4		300	48	8	762
February	161	175	28	3	3		262	36	4	672
March	185	194	37	5	3		277	33	8	742
April	162	192	45	4	2	4	313	40	4	766
May	181	92	33	16	0		307	55	7	691
June	108	200	51	16	1		331	58	4	769
July	109	95	84	18	1		363	55	1	726
August	111	119	100	14	2		417	73	3	839
September	106	207	113	8	0	2	339	51	6	832
Total	1,649	2,774	783	103	19	6	3,576	574	58	9,542

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1911-12	Tuberculosis	Diphtheria	Typhoid	Malaria	Rabies	Glanders	Milk	Water and Sewage	Miscellaneous	Total
October	115	452	108	16	3	1	342	60	4	1,101
November	138	689	71	5	1	10	291	33	36	1,244
December	126	626	61	7	1	3	257	38	11	1,130
January	122	267	70	8	1	4	325	35	5	837
February	144	190	46	4	2	17	276	27	11	717
March	153	196	47	6	2	35	329	29	6	803
April	168	113	37	5	5	34	376	26	4	768
May	169	280	51	12	9	34	356	45	1	957
June	131	92	58	12	2	32	315	36	5	683
July	126	65	77	9	4	31	398	39	4	753
August	119	73	108	18	5	50	450	52	7	882
September	106	142	99	6	4	66	427	52	4	906
Total	1,617	3,185	833	108	39	317	4,142	472	68	10781

TUBERCULOSIS.

Table III. gives a classification of the specimens of tuberculosis examined.

TABLE III. TUBERCULOSIS SPECIMENS CLASSIFIED.

	Positive	Negative	Total
1910-11	447 28%	1,202 72%	1,606
1911-12	342 21%	1,275 79%	1,617
Total,			3,223

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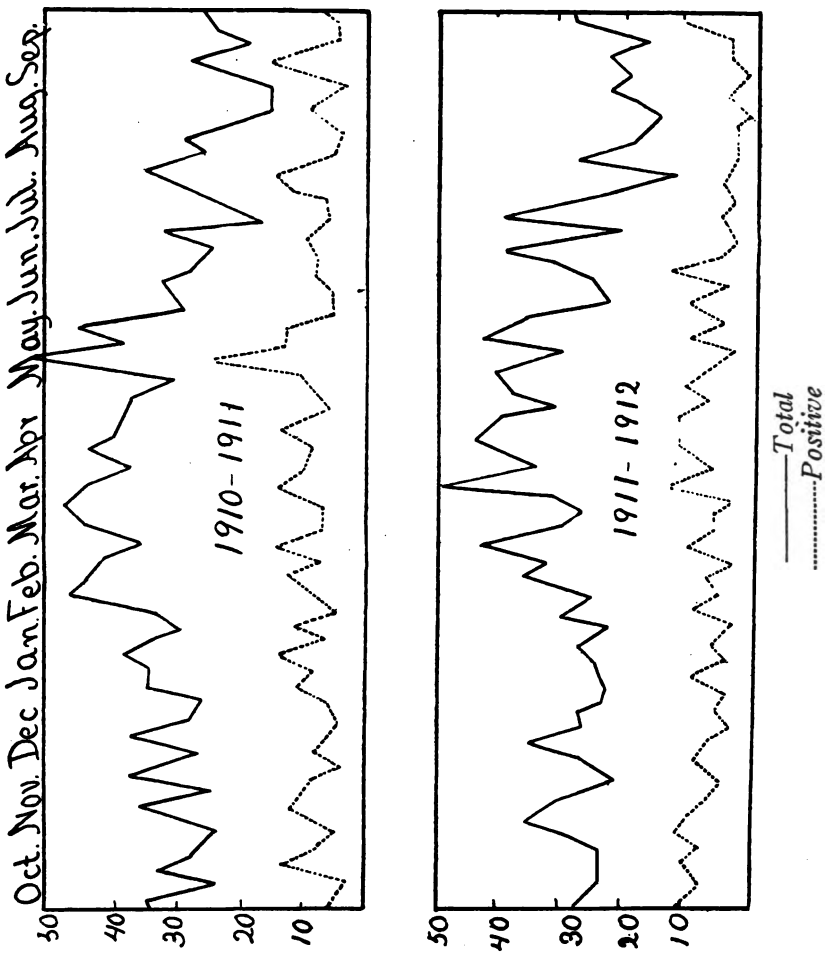
TABLE IV. CHART SHOWING SPECIMENS EXAMINED FOR TUBERCULOSIS WEEKLY.



The number of cases of tuberculosis examined have been about the same as in the previous two years. The percentage of positive cases in the first year was high; in the second year there was a decided falling off in the percentage of positives. Whether this has any significance, however, we are uncertain.

Table IV. shows the distribution of the specimens month by month as they have been presented for examination. A study for the curve of Table IV. will show that while there is a slight increase in the number of specimens received during the spring months, over the number of the other periods of the year, there is not very great increase at any one particular season. There is no marked seasonal curve such as is found in diphtheria and in typhoid fever as shown in Table IX.

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The method used in our laboratory for the examination of sputum specimens during this last two years has been the same, with very slight modifications, as that used in the previous period, and is as follows: The sputum, which we receive in wide mouthed bottles, is mixed with 2 cu. cm. of *antiformin*, made by a method described below. These bottles, tightly closed, are shaken for ten minutes in a sputum shaker, after which they are allowed to stand quietly for one hour. There is then added to each bottle a sufficient quantity of *legroin* to fill the bottle to the shoulder, after which all of the bottles are placed in a centrifugal machine and centrifugalized for ten minutes. Upon removing the bottles from the machine, there is found to be a thin layer separating the legroin from the heavier liquid below. By means of a spirally coiled platinum loop, a quantity of this layer is removed from the vial and spread thinly over a common microscopic slide. This is then fixed by heat, stained with carbo fuchsin and subsequently decolorized with a 5 per cent. of hydrochloric acid in 95 per cent. alcohol. After complete decolorization, the surplus decolorizer is washed off with running water and specimens counter stained with methylene blue.

While we have been unable to see any very marked increase in the percentage of positives obtained in this way over those obtained by the previous method without the antiforum digestion, this method certainly gives as high results of positive cases as we have obtained previously, and in the manipulation, the results are much more satisfactory. It is more easy to spread the material in a uniform layer over a microscopic slide if the sputum has been thus digested, and the smear is much less likely to peel off. An incidental advantage is the value of antiformin in disinfecting the specimen and rendering it, therefore, less liable to be dangerous to handle in the laboratory.

We have found it more satisfactory to make our own antiformin for this manipulation than to purchase it. The method which we have adopted for making it is as follows:

DIRECTIONS FOR MAKING ANTIFORMIN.

Dissolve 720 grams of commercial chloride of lime and 260 grams of washing soda (Na_2CO_3) in 2,500 c.c. of water. Allow the mixture to stand over night and filter. Determine the amount of chlorine in the solution as follows:

Make a one-tenth normal solution of sodium thiosulphate (2.483 gms. $Na_2S_2O_3$ in 100 c.c. water). Dissolve 1 gm. of KI in 100 c.c. water. Mix ½ gm. of starch in 100 c.c. water. Place 1 c.c. of the chloride of lime solution in a small flask; add 10 c.c. of a .25 per cent. acetic acid and add also the above prepared KI solution to excess, i.e. till the solution is dark red. Now add a little of the starch solution as an indicator and titrate with the thiosulphate solution till a blue color appears. Each 1 c.c. of the thiosulphate required indicates .003545 gms. of chlorine; hence the number of c.c. determined by the titration multiplied by .003545 will give the number of grams of chlorine in each c.c. of the solution, and this multiplied by 100 will give the percentage.

After determining the chlorine the chloride of solution is diluted so that it will contain 5.6 per cent. of chlorine, and then 7.5 per cent. of caustic soda or potash is added, the whole filtered and is then ready for use.

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DIPHTHERIA.

The total number of examinations made for diphtheria during the period covered by this report is 5,959. The classification of these cases is shown in Table V, and their distribution during the different months of the year in Tables VI. and VII. The noticeable feature of this chart is the marked rise in the number of cases that occurs shortly after the opening of the schools in the fall. This marked rise in the number of cases which appears in late September and October has been noticed by many, and is beyond doubt associated with the schools and the close associations of the scholars in the school rooms. It occurs with such regularity every year that it has come to be a matter of confident expectation that the amount of work upon diphtheria will very rapidly increase with the opening of the schools in the fall.

TABLE V. DIPHTHERIA EXAMINATIONS CLASSIFIED.

1910-11	Positive.	Negative.	Doubtful.	Total.
Diagnosis,	316	697	35	1,048
Release,	494	1,193	39	1,726
Total,	810	1,910	74	2,774

1911-12	Positive.	Negative.	Doubtful.	Total.
Diagnosis,	106	818	22	946
Release,	792	1,528	9	2,239
Total,	808	2,346	31	3,185

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TABLE VI. CHART SHOWING SPECIMENS EXAMINED FOR DIPHTHERIA WEEKLY.

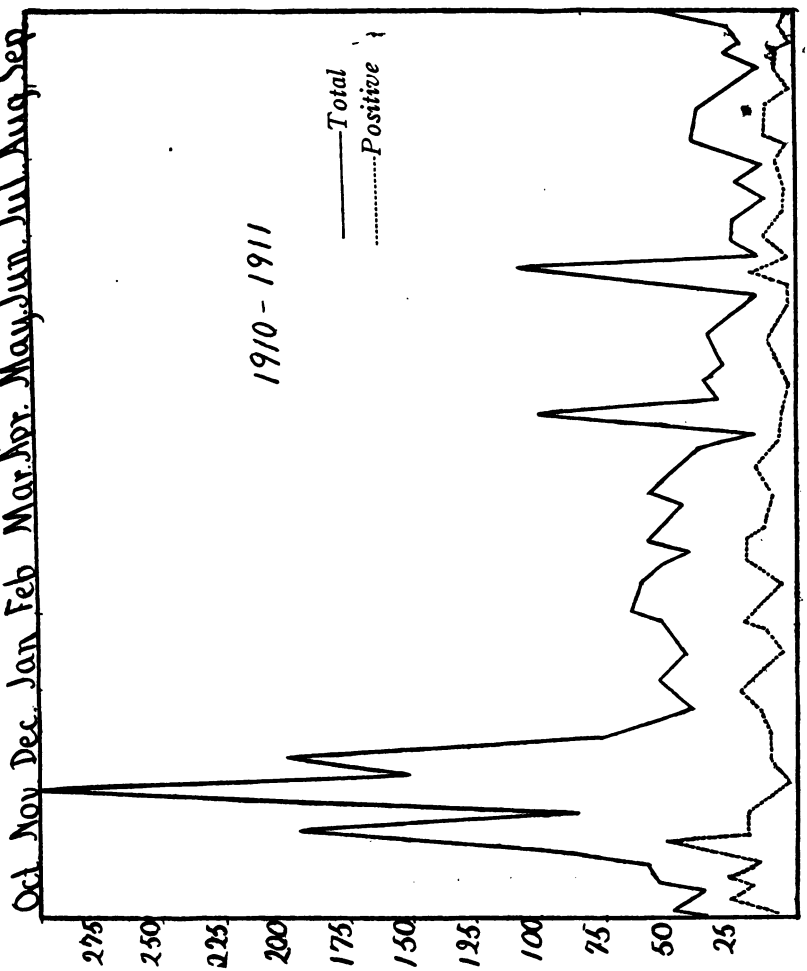

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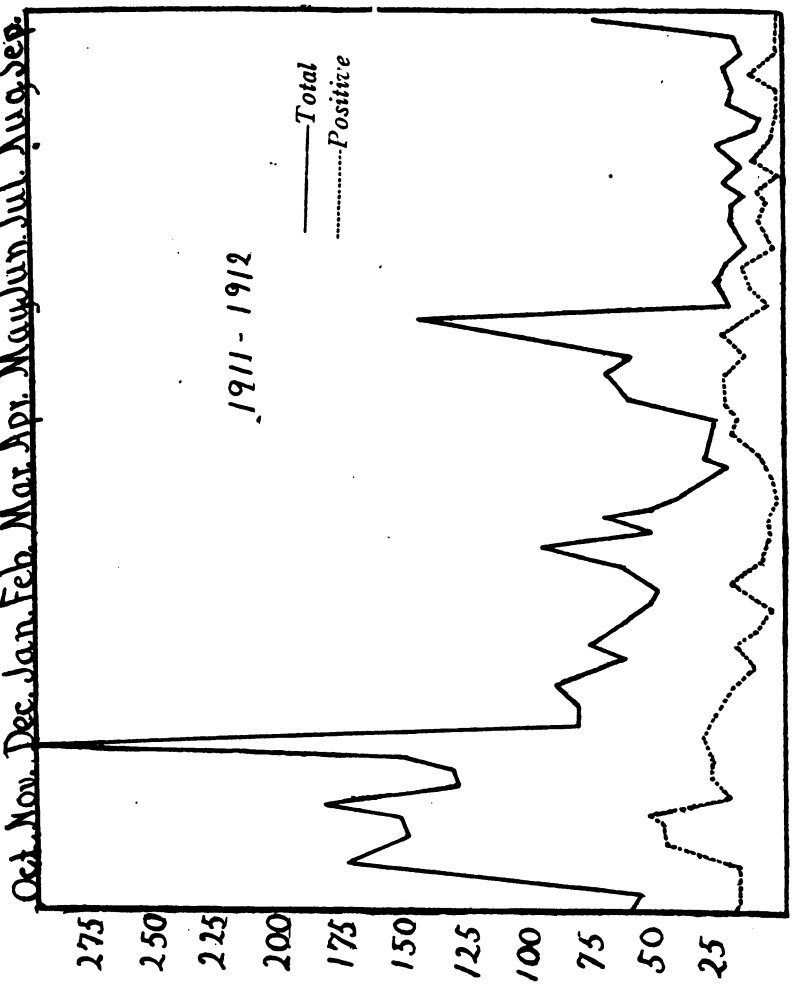
TABLE VII. CHART SHOWING SPECIMENS EXAMINED FOR DIPHTHERIA WEEKLY.



OUTFITS—There has been no change in our methods of obtaining diphtheria specimens during the last few years. The outfits which we now use are simply swabs of cotton upon the ends of wooden rods. These are enclosed in a test tube, plugged with cotton and carefully sterilized. The test tube is then placed inside a metal container, enclosed within a second one of a similar nature in order to keep within the requirements of the U. S. Postal Department. The physician is requested to inoculate the swab from the throat of the suspect, enclose it at once in the test tube and return it to he laboratory immediately. As soon as it is received by us, we inoculate tubes of Loeffler's blood serum from the swabs, incubate them for 12 hours and make our examination. Only where we are especially requested to do so, do we make a direct examination of

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the swabs, recognizing that it is useful in only certain cases and that at all events, a negative result could never be relied upon when made from the examination of the swab direct.

We have ceased several years ago to furnish the physician with the tubes of coagulated serum, preferring to depend upon the swabs simply, and to make all inoculations upon serum ourselves here at the laboratory. It is quite possible that some error is introduced in this way, and probable that if it were feasble to put the fresh serum tubes in the hands of physicians, allowing them to inoculate them directly at the bedside of the patient, a larger number of positive results might be obtained than are obtained when the dried swabs are sent to us after the present fashion. Concerning this, however, there seems to be difference of opinion, for different laboratories seem to have obtained different results when they compare the inoculations made with the dried swabs with those made with the swabs fresh from the patient. However, this may be, the experience of this laboratory for some years before adopting the present method showed such great practical difficulty in the way of keeping physicians supplied with proper tubes of coagulated serum, that we decided to give up the practice. The obstacles in the way of successfully distributing the serum tubes themselves are several.

First—It is difficult to obtain a convenient mailing tube which will meet the postal requirements and at the same time not be too heavy. Second—We have found it difficult to be sure that the tubes furnished the physicians are absolutely sterile before they leave the laboratory, and an occasional failure of complete sterilization has produced a great deal of trouble. Third—We have found that thoroughly sterilized tubes will, in the hands of physicians, frequently become covered with mold growth, the mold growing through the cotton plug and eventually reaching the serum. Fourth—We frequently found physicians would keep these serum tubes until they had become old, dried, and useless, and would still attempt to inoculate them and send them to the laboratory with an expectation of obtaining satisfactory results.

While we were furnishing the serum tubes to physicians, these difficulties were constantly obtruding themselves and producing a large amount of dissatisfaction. We have, therefore, concluded that the errors which arise from the method of sending the dried swabs, and allowing us to make the inoculation upon the serum tubes after they have reached our laboratory, are, on the whole, less than the errors which we experienced by the previous method of attempting to keep fresh serum tubes in the hands of the Health Officers and physicians in the state. For another reason still, we believe our present method is more satisfactory for our conditions than the former one. It was impossible to attempt to supply individual physicians in the state with diphtheria outfits in any considerable numbers as long as we were obliged to keep in their hands fresh serum tubes. It was then possible to handle these only through the Health Officers and a few drug stores in the state. Country physicians are very widely scattered and it frequently happens that they wish for an outfit for sending diphtheria samples to the laboratory at a time when it is impracticable or impossible for them to communicate with the Health Officer or to reach a drug store where the outfits are obtained. In many such cases, a specimen would be obtained and forwarded to us if the physician had an outfit in his possession, whereas they will not be sent if he is obliged to hunt up the Health Officer to obtain a fresh serum tube before he can make a culture. In dealing with such a large number of physicians spread over a wide territory, as the miscellanous doctors in a state of this size, it is practically impossible to make the attempt to supply each one with fresh serum tubes. But the outfits which we now furnish are simple, fairly cheap, and will keep indefinitely. It is, therefore, not much trouble or expense to furnish each doctor in the state who wishes them, a few of these outfits, so that they can have

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them constantly on hand and ready for use whenever they have need of them. In this way, the usefulness of a laboratory covering a whole state is very much increased, and we find that there is a very much larger use of the laboratory by physicians since we have adopted this simple method of obtaining and shipping specimens to the laboratory. For all of these reasons, we are convinced that this method, although it involves a certain amount of error, and possibly will not give as large percentage of positive results as if we could furnish the serum direct, has for our conditions very decided advantages over our previous method, and that it increases the usefulness of the laboratory to the physicians of the state. We, therefore, see no reason for changing the method which we have had in use for two years.

During the last two years, we have tried two other media for cultivating diphtheria germs, besides Loeffler's blood serum. These media have been artificial media (North's medium and one furnished by Heinneman), containing no blood serum and much simpler to prepare in the laboratory than blood serum, because the ingredients may be kept on hand and preserved indefinitely. It has, however, been our experience that none of these are as satisfactory as blood serum. It is true that some of the media that we have tried will produce a luxuriant growth of the diphtheria bacilli when pure cultures are inoculated upon them. When, however, the ordinary swab from a suspected throat is inoculated upon these artificial media and at the same time upon Loeffler's blood serum, we have found a decided superiority in the use of the blood serum, since some specimens which give us a good growth of diphtheria germs on blood serum fail to give us such growth on the artificial media. After testing them side by side with blood serum, we have been convinced that they are not satisfactory as a substitute for blood serum, and have given up the thought of using them in routine work.

Method of Examination.—Our routine method of microscopic examination is to stain the specimens with Loeffler's methylene blue. Ordinarily, this method of staining is the only one used. In doubtful cases, however, we have confirmed our results by the Neisser stain, and have found it extremely useful as a confirmatory stain to be used after methylene blue. We prefer to use the methylen blue as a regular stain rather than the Neisser, however, because it is much less taxing upon the eyes.

Cultures for Release—A study of the specimens sent us for release and for diagnosis has shown that many physicians in the state are in the habit of sending specimens *for release only,* relying wholly upon clinical diagnosis for detecting the presence of the disease. On the other hand, other physicians send us specimens *for diagnosis only,* and we receive no subsequent specimen from them for the release of the patient from quarantine. There is no doubt that either of these methods of procedure is unfortunate. That patients having clinical diphtheria should not be released from quarantine until an examination of the throat has shown that they no longer harbor diphtheria bacilli, is too well recognized to-day to require any emphasis. In this state, it is not common for Health Officers to require more than a single negative report before releasing the patient from quarantine, although a few Health Officers require two. Experience of other states has clearly shown that a single negative is not sufficient to determine positively that the patient has ceased to be a carrier. In examinations of the Boston City Laboratory during the last year, for example, it has been found that 18 per cent. of the release cases reported as negative in the first examination were found to be positive when a second examination was made. From this it would follow that 18 per cent. of the cases which are reported as negative are not in proper condition to be released, and that the method of releasing them for a single negative is not an adequate protection to the public. Of course it requires

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more time and trouble to obtain two negative cultures than one, and the patient must be kept somewhat longer in quarantine, but the public cannot be really protected against active "carriers" if patients are released on a single negative culture. At all events it is quite certain that two negatives should be required before a patient is allowed to attend school, a conclusion so evident that it hardly requires emphasis.

It is an equal mistake on the part of physicians to depend upon clinical diagnosis alone for determining whether or not they are treating a case of diphtheria, although not a few physicians in the state apparently follow this procedure. It is a perfectly well known fact that there are many cases of mild sore throats, which are characterized by the presence of the diphtheria germs, and which show no clinical evidence of diphtheria. Experience collected by various laboratories has indicated that at least 15 per cent. of the common sore throats, which doctors do not diagnose as diphtheria, are accompanied by the presence of this germ; doctors who regard these as negative and not to be treated as cases of diphtheria are, therefore, liable to make an error which may be disastrous to the community. Abundance of evidence shows that, although these persons themselves may not be clinically ill with diphtheria, the germs are in their throats and are frequently a source of danger for other susceptible individuals. Such individuals may be perhaps called "carriers" instead of patients; but plenty of evidence indicates that a carrier of the diphtheria bacilli, who is himself perfectly free from any clinical sign of the disease, may distribute the disease to others. In our experience in this city we have found a number of very clear cases of school children who are "carriers," i. e., persons who seem to be in perfect health and yet carry these germs in their throats. But these carriers have been found to transmit this disase to those with whom they came in contact. In a recent epidemic of diphtheria in the public schools in Middletown several instances were found where a perfectly well scholar who was shown to have diphtheria germs in his throat conveyed the disease to his brothers and sisters at home. From these facts it is evident that any person who has the diphtheria germs in his throat may be a source of danger to others. Hence it follows that the cases which the doctors fail to diagnose as diphtheria and yet contain diphtheria germs in their throat, are really a greater source of menace to the community than the frank cases of diphtheria. These will not be guarded as will a case of diphtheria; or they will be quickly released and will mingle with other persons, and all the time, being carriers of these germs, will be a means of distributing them. Hence it follows that this 15 per cent. of cases of sore throats, that doctors fail to diagnose as clinical diphtheria, are probably a greater source of danger to the public in distributing diphtheria, than are the frank cases that are recognized by the physicians as true diphtheria. From all of these facts, it becomes perfectly evident that the only safe procedure from a public health standpoint is to have throat examinations made of all cases of sore throats among children, especialy of all who attend school; and then to regard as "carriers" any that show the diphtheria germs in their throat, and to keep these isolated from contact with other scholars until such time as subsequent examination (two consecutive negatives) shows that they have become free from the diphtheria germ.

It seems extremely probable that the outbreaks of diphtheria in the schools, which are practically sure to follow their opening in September, may be due to some such unrecognized cases. Bacillus carriers, not recognized as such by their parents and, of course, not called to the attention of the physicians at all, entering into the school and associating with other scholars, serve as the starting point from which the diphtheria spreads, and the germs from these carriers finding their way into the throats of scholars that are not as immune against them as the carriers themselves, finding there a more favorable locality for growth, develop and

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produce clinical diphtheria and start the epidemic. For all these reasons, it is perfectly clear that the physician who fails to have cultures made from the throat of all suspicious patients, especially among school children, is not doing his duty toward the public health, and not doing his share in enabling the Health Officers to fight with this serious disease. It is, therefore, strongly urged that Health Officers in the state, so far as possible, insist upon the physicians in their locality using the laboratory diagnosis in all cases of throat trouble where there is the slightest suspicion, and insisting absolutely upon releasing no one from quarantine until subsequent release cultures have shown the individual to be free from the bacilli of diphtheria, two negatives being preferable to one for this purpose.

DIPHTHERIA IN THE SCHOOLS.

Method of Control—In the last report of this laboratory, there was described a plan for checking diphtheria in the schools and preventing the occurrence of the epidemics, which so commonly develop with the opening of schools everywhere. As there described, the plan was for the Health Officer to keep a careful watch upon the schools, and, as soon as a single case of diphtheria should appear in any school, to have a swab made from the throats of all the children in that school, at least from those in the same room as the patient. An examination of these swabs at the laboratory followed and the individuals who showed that they were "carriers" of the diphtheria germ were to be temporarily excluded from the schools, and to be kept out of school until subsequent examination should show that their throat had ceased to contain diphtheria bacilli. This plan, which had been tried in two or three schools when a report was made two years ago, has been somewhat more extensively used in the period covered by this report, and the results are of significance enough to deserve special notice here. In the year 1910 and 1911, five towns in the state adopted this plan of fighting school diphtheria, and in the year 1911 and 1912, ten different towns adopted the same method. The conditions under which the different schools have undertaken this work have been quite varied. In some cases, general throat examinations were made at the first appearance of diphtheria in a single school room, while in other instances no especial attention has been paid to the matter until the disease was pretty well distributed in the town, and especially among the school children. As a result, in the examinations which we have made, the percentage of carriers which we have found in the schools has varied all the way from zero, which has been the case in two schools, up to 30, 40 and 50 per cent. of the samples submitted for examination, the latter occurring only where the plan was adopted late in the epidemic. In some cases, only scholars occupying the same room with a clinical case have been tested this way, while in other cases, the Health Officials have gone through a whole building and sent us cultures from all school children in the building.

Results—So far as we can learn, this method of handling diphtheria is thoroughly satisfactory, and is always efficient in rapidly checking the spread of an epidemic. Health Officers, who have used the laboratory for this purpose have not always taken the trouble to inform us of the results of their work; but where we have been able to learn of the practical application of this plan, it has been extremely efficient. Moreover, from our general examinations we have found that the number of clinical cases from the towns thus treated, rapidly fall off after the school cases are handled in this way. In some instances, Health Officers have directly communicated with us and have told us of their experience. They have sometimes found it possible to trace the diphtheria to a single family, or a small group of families living closely associated together and

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whose children, attending the public schools, were the distributors of the disease germs, even though themselves not at the time clinical cases. In such cases, the exclusion of these families from the school for a short time was sufficient to check the spread of the epidemic. In other cases the laboratory examination has picked out three or four children as carriers, all of whom were found to come from one family and to have one source of infection. In some cases the laboratory examination has detected as carriers, children who, being taken out of school, developed clinical diphtheria three or four days after the laboratory examination. Such individuals, of course, if they had been allowed to remain in the school until clinically ill, would have been meantime a source of menace to the others in contact with them. It has been found also, as a rule, that these carrier cases remain carriers for a short time only, and need to be excluded from school for only a comparatively few days. Usually a second examination, taken a week after the first, proves them to be free from germs, though sometimes they still retain them for a period longer than this. So far as we can judge from the data which we have, in all cases where this method has been adopted, it has been completely successful in quickly bringing a diphtheria epidemic to an end, and preventing its further extension.

Extension of the Plan—Health Officers in other states and cities have, during the last two years, been adopting a similar method of handling school diphtheria. In a recent meeting of the American Public Health Association, several officials reported the adoption of a plan similar to ours, and always with successful results. The method adopted in different places has not always been exactly that which is outlined above, but with certain differences in slight details, Health Officers in different states are now finding this plan of the examination for bacillus carriers an extremely useful aid in fighting this disease. We, therefore, would urge upon Health Officers, at least in our smaller towns, to use this method wherever it is needed. In large cities where many hundreds of children are brought together in one large school building, it becomes somewhat more difficult to handle the large number of specimens necessary. In the smaller towns, however, where only one or two hundred scholars are likely to be brought closely together, there is no considerable difficulty in having an examination made of all possible contacts, quickly enough to enable the Health Officer to check the distribution of diphtheria epidemics promptly. This laboratory holds itself ready, to the limit of its equipment, to furnish swabs in sufficient number to meet such cases when called upon to do so, and make exminations as rapidly as possible. We therefore, advise that whenever diphtheria appears in any school rooms, all scholars in the room be examined at the earliest possible moment for the purpose of detecting the bacillus carriers and temporarily excluding them from the school until the subsequent examination shows that they can safely be allowed to mingle with other children.

Advantage Over Closing the Schools—It seems likely that this plan of fighting diphtheria in our schools will supersede the older method of closing the schools after the disease has made its appearance. The new plan has several distinct advantages over the older one. The closing of the schools being a last resort, will not be adopted until the disease becomes somewhat common among the scholars, by which time the bacilli of the disease are pretty widely distributed through the schools as examinations have shown. Moreover, the closing of the schools does not separate the children who have the bacilli in their throats from the others who are likely to be infected by them, but simply throws them altogether on the street and in each other's houses, where there is just as much danger, or perhaps even more, than in the school room itself. Worse than this, the closing of the school places these children quite beyond inspection and beyond any proper attention. It is well

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known that in the poorer section of a community, the children have practically no medical attendance, and these children, who have already become bacillus carriers are, by the closing of the schools, placed beyond the possibility of any further supervision. They are from that time out of the reach of the Health Officer unless they chance themselves to become clinical cases.

On the other hand, the plan of the throat examination and the temporary exclusion of the scholars which show bacilli in their throats has very decided advantages. It keeps the healthy children in a group by themselves in the school, and separates them from those who are temporarily a source of danger. Moreover, this plan informs the Health Officer at once where the danger centers are, where he may expect infection, and consequently what families are to be especially watched in the community. For these reasons, the plan of temporarily excluding from the school bacillus carriers only, leaving the schools open to the other children who are intact, certainly is a more efficient method of handling epidemics than the plan of waiting till several cases occur and then closing the schools entirely. It is a safer method for the children themselves, and far safer for the community at large, and as soon as it is understood by the community, this plan will certainly be recognized as the better method of controlling school diphtheria. It is true that the public has been accustomed to the plan of closing the schools, and perhaps at present some would be likely to criticise Health Officers as neglectful of their duty if they did not close the schools as soon as a number of cases of diphtheria made their appearance. Moreover, many parents who are ignorant of the reason of the procedure, may be indignant at having their children sent home as infected with diphtheria germs. The children themselves are perfectly well, have perhaps no sore throat and the parents are sure that nothing is the matter with them. These parents being quite ignorant of the disease and the reason for which their children are sent home, are apt to be outspoken in their opposition to the Health Officer in the enforcement of the regulation for their own children. In some cases, we have learned that children that are thus excluded from the schools, are even sent by their parents to the dentist to have their teeth attended to. But these objections are purely temporary, and a little care in giving a frank explanation to the public of the reasons for the plan will soon bring all to see the wisdom of this method of handling diphtheria epidemics. It will then be recognized that the Health Officer who adopts this plan is taking the most satisfactory method of protecting the public from diphtheria, and by far the best method of protecting the health of our children in our schools. Health Officers are, therefore, urged to use this method of controlling diphtheria in the future and this laboratory holds itself ready to co-operate with them to the extent of its equipment and so far as it can do so with the appropriation which the state grants for its support.

Disinfection—The futility of disinfection of the school rooms in school epidemics is manifest. The real sources of danger, and the agents for distributing the diphtheria germs, are the *scholars,* either patients or carriers, who harbor them in their throats and perhaps on their clothes. To send them home, and disinfect the room after the germs have been carried away by the scholars, is evidently useless, and to allow the scholars then to come back again, without personal throat examination is only to undo any possible good that the disinfection may have done. While disinfection may sometimes be an added safeguard, *it cannot be efficient so long as bacillus carriers are allowed to attend school.*

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TABLE VIII. SCHOOL EXAMINATIONS FOR DIPHTHERIA.

1910-11	Positive.	Negative.	Total.
From five towns,	53 7%	662	715
1910-11 From ten towns,	148 13%	988	1,136

TYPHOID FEVER.

TABLE IX. TYPHOID SPECIMENS.

	Positive.	Negative.	Doubtful.	Total.
1910-11	222	522	29	773
1911-12	380	552	4	936
	602	1,074	33	1,709

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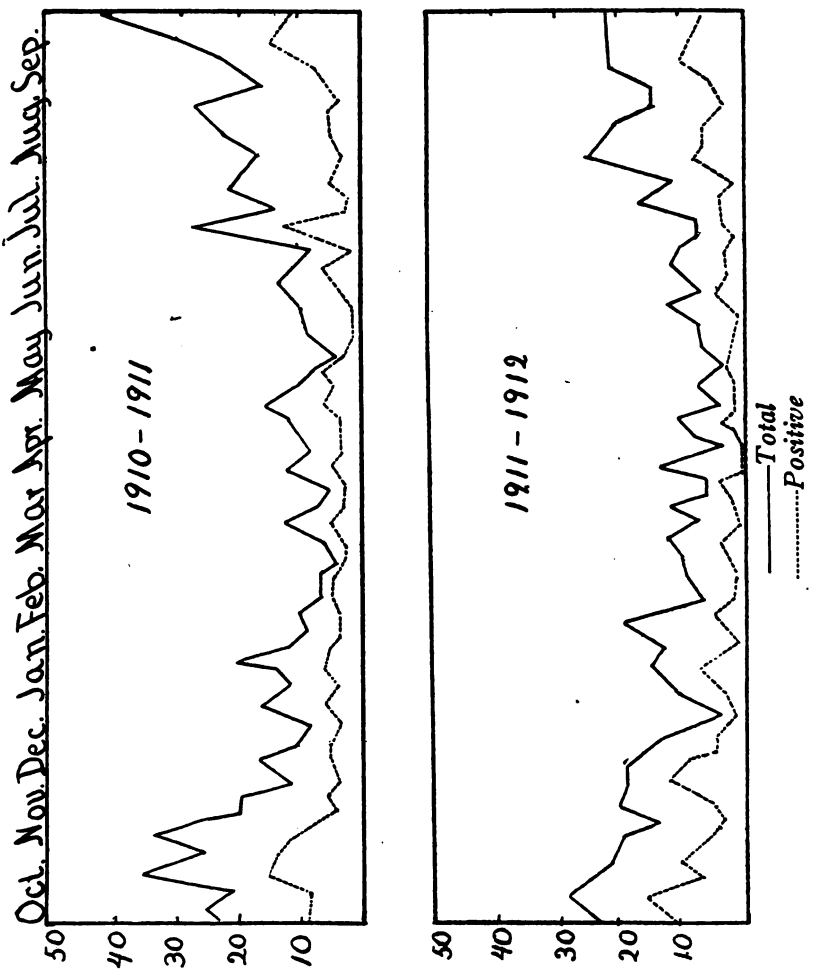
TABLE X. CHART SHOWING SPECIMENS OF TYPHOID FEVER EXAMINED WEEKLY.



As shown in Table IX. the number of specimens examined for typhoid fever in the last two years has shown a marked increase over the previous period, a fact which does not necessarily indicate any increase in typhoid fever, but rather shows that the physicians in the state are coming to rely upon the laboratory for the diagnosis of this disease more than in the previous years. The distribution of the specimens received here month by month is shown in Table X. There appears the usual marked rise in the number of cases in late summer and the early fall months, followed by a decline in the late fall months and the winter. During the period covered by this report occurred the severe and well known epidemic of

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typhoid fever in Torrington. When this epidemic first appeared, quite a number of specimens from the place were sent to us for diagnosis, all of which proved to be typhoid fever. After this, however, physicians, realizing that they had a typhoid epidemic in their midst, did not usually take the trouble to send blood samples to us for diagnosis, regarding all suspected cases as true typhoid. As a result, in our curves, shown in Table X., the typhoid epidemic at Torrington makes no record of itself, since a very small proportion of the cases occurring at that place were sent to this laboratory for diagnosis.

Outfits—During the last year, a change has been made in the style of the outfit furnished to physicians in this state. Until within about a year, we have supplied a capillary tube with a rubber bulb at one end for the purpose of drawing blood into the tube. It has been found difficult to procure these rubber bulbs, and, moreover, they very rapidly deteriorate so that if one of our outfits is kept in the hands of a physician for a longer time than usual, the bulb becomes so hard and useless that a physician cannot use it to draw the blood into the tube. We have, therefore, adopted a different device that is in use at the present time. We furnish a similar capillary tube, but one end is blown into a small glass bulb. The physician is directed to heat this bulb slightly, with a flame of a match or some other source of heat. The heat drives the air out of the bulb, and, as it cools, the air being drawn in again, furnishes the necessary suction for drawing the blood into the capillary tube, and thus collecting the blood. The physician is directed to seal the tube in a flame, replace it in the wooden block which we furnish and return it to the laboratory. The only objection to this outfit is the fact that the capillary tube, being rather delicate, is easily broken and quite a number of complaints have reached us that these tubes are broken before they get to the hands of the physicians. This is in a measure being remedied by packing them in cotton, which largely prevents the breaking, and at the present time we have few complaints of these tubes being broken.

Routine Method.—Our method of carrying out the Widal test is briefly as follows: When the capillary tubes reach us, the tip is broken off and again by heating the bulb, the serum which has separated from the clotted blood in the tube is forced out upon a clean glass slide. A small drop of this serum is then drawn up in a very long especially prepared capillary tube and transferred to a clean space on the slide. In this same capillary tube, there is then drawn up a sufficient quantity of sterile water to dilute the drop of serum twenty times. This is quite easy to do, measuring it in the capillary tube. A drop of this mixture is then placed upon a cover glass with a similar size drop of a twelve to twenty-four hour culture of the typhoid bacillus, a small platinum loop being used for obtaining equal sized drops. This mixture is then placed over an inverted moist chamber, incubated for a half hour at 37 degrees, and then examined under the microscope for agglutination. We usually place upon the same cover glass, two different dilutions of blood, one giving us a final dilution of twenty and the other of forty, and in diagnosing the case, both dilutions are examined and both are taken under consideration. We find practically no instances where agglutination occurs in the dilution one to twenty, and not in the dilution one of forty, so that the two different dilutions practically always agree in results. If it should chance that there is an insufficient quantity of blood drawn into the capillary tube by the physicians, so that we cannot obtain a drop of clear serum, we proceed by another method. We then draw into the capillary tube, some sterile water, allowing a tube to stand for a little, subsequently forcing out the water containing the dissolved part of the blood. Then we dilute this with water until a color is obtained, which, by experience, we have learned to be practically equivalent to a one to forty dilution. This last method is essentially identical with that which is used in laboratories that depend

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wholly upon a drop of dried blood instead of serum. The results of the two methods are essentially the same.

Agreement of Laboratory and Clinical Diagnosis.—During the last year we have continued the practice of sending to physicians, return postal cards, asking them to forward to us final reports upon the clinical results of the cases which have been sent to us to be diagnosed by the Widal test. During this year, we have received replies from about 650 of the cases which have been diagnosed in this laboratory. The results have been quite satisfactory. There have been quite a large number of specimens sent us too early in the disease for accurate diagnosis, the blood being collected within four or five days from the time of the first symptoms, and these must naturally be excluded as of no value. Leaving these aside, we find that of the 650 specimens from which we have returns, there have been about 6 per cent. of error in our diagnosis. This is about the average result obtained in general in comparing the Widal with the clinical diagnosis. The errors which have been found have been mostly instances where the laboratory has failed to get any indication of typhoid, while the physician has pronounced the case as clinically this disease. Among the 6 per cent., however, there have been eight out of the 650 in which the laboratory has diagnosed the case as positive, showing a distinct agglutination, and the doctors have pronounced the case as negative.

During the period of this report, two specimens have been sent us to be examined for *para typhoid.* Only one of these has proved positive. In this case, the physician wrote us that it enabled him to clear up an obscure case that had been troubling him very much.

Six specimens of faeces have been sent to us to be examined to see whether the individual concerned was a *typhoid bacillus carrier.* Although this has not been adopted as one of the routine parts of the work of this laboratory, we have felt it was a matter of such importance that we have gladly undertaken it. The method of examintion which we have adopted, is essentially the following:

Endomedium is used as the basis for the first isolation. About 10 c. c. of this is melted and poured out into a Petri dish and allowed to harden. This dish is then kept with the cover off, for about an hour in an incubator for the purpose of somewhat drying its surface; or the Petri dishes may be left over night exposed to the ordinary air protected from dust, for the same purpose. Then a small quantity of faeces to be tested is diluted in a sterile watch glass or test tube with sterile water, and a loop full of this spread over the surface of the Endomedium in as thin a layer as possible. The Petri dish is then covered and placed in the incubating oven for twenty-four hours, after which it is removed, and carefully examined. Ordinarily the only colonies that grow in abundance in this medium are those of colon and of the typhoid bacillus, and these are very easily distinguished from each other. The colon bacillus produces colonies that are of a brilliant, crimson red and the Endomedium in the vicinity of the colony is also red. The typhoid bacillus on the other hand, fails to produce the red color, or at most only a faint pinkish, and never colors the medium red in its vicinity. While other types of bacteria grow upon Endomedium to a certain extent, none of them grow as luxurinatly as these, and when an examination of faeces is made, nearly all of the colonies present will belong either to the colon or the typhoid variety. It is quite easy to distinguish the typhoid colony from the colon, and when the Endoplate is examined after 24 hours' incubation, the typical typhoid like colonies can be separated at a glance from the typical colon form. Several of these typhoid colonies are now fished out and inoculated into agar tubes and subsequently purified. Eventually they are inoculated into bouillon tubes, incubated for about 24 hours, after which they are tested against anti-typhoid serum. In case the suspicious colonies are the typhoid bacilli, they will show an agglutination power when tested with anti-ty-

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phoid serum, this agglutination, of course, not making its appearance if the organisms are any other than typhoid bacilli.

The technique of this examination of faeces for the detection of typhoid bacillus is rendered very much easier and quicker by the use of Russell medium which has been recently adopted. Russell medium contains a small quantity of litmus which gives a faint purplish color to the medium. Agar slants of this medium are made, and inoculated with the suspected colonies isolated upon the Endoplate. After incubation of about 24 hours a very sharp clear differentiation is found between the true typhoid cultures and others that resemble it. Colon bacillus turns the whole medium red and usually shows gas bubbles. The bacillus enteriditis turns the whole Russell medium a blue color. The para typhoid bacillus usually decolorizes the medium. The true typhoid bacillus, on the other hand, turns the lower half of the medium red and the upper half blue. When the suspected colonies from an Endoplate are, therefore, inoculated into Russell medium and incubated for 24 hours, it is at once possible to pick out, with almost unerring certainty, all of those that are at all likely to be typhoid bacilli from their color reaction in this medium. It is, then, only necessary to test the agglutination properties of those that give the proper reaction in Russell medium. This is a very great saving in the amount of labor, for the agglutination test is time consuming, whereas the inoculation in Russell medium is very quickly done. Moreover the use of the Russell medium gives an additional confirmatory test. If, therefore, any suspicious colonies are found on the Endomedium, they are planted in Russell medium and incubated for 24 hours; those that now show the proper color reaction are inoculated into bouillon and the next day tested for their agglutinating properties. If they prove to be capable of agglutinating, with anti-typhoid serum, they are regarded as typhoid bacilli.

It is becoming somewhat common for laboratories to be called upon to make examinations of faeces for the purpose of detecting bacillus carriers, a procedure which is to-day recognized as one of the valued means of controlling the public health. This is especially useful in cases where the patient recovering from typhoid is employed in any business where he is likely to distribute this disease to others, as, for example, in a dairy or in the handling of milk. In such cases an examination for the typhoid carriers is a matter of great importance in protecting the health of others. The recognition of the typhoid carriers explains many an obscure case of typhoid fever and would undoubtedly give the reasons for some epidemics which have been puzzles. Examination of faeces for this purpose is, therefore, becoming quite a common procedure in laboratories and beyond much doubt in the next few years, this will become a recognized matter of the routine work of all properly conducted bacterioloical laboratories, and this laboratory will inevitably be called upon to make a considerable quantity of such examinations.

To physicians wishing to have faeces examinations made in this laboratory for the purpose above indicated, the following directions alone are necessary. Open one of the regular diphthteria outfits, furnished by this laboratory and place in the test tube a small quantity of the faeces to be examined. Replace the cotton plug, put the whole again in the case and ship to this laboratory with full information as to what is wanted. It is necessary to have the specimen shipped promptly so that it may reach the laboratory in as fresh condition as possible, for the typhoid bacilli die after a day or two, and we may fail to find them present unless the examination is made upon a fresh specimen. Moreover, it is desirable that physicians who are proposing to forward specimens to the laboratory for this purpose, shall inform us beforehand as to when we may expect them, in order that we may be prepared to handle them as soon as they arrive. While we endeavor to keep proper media on hand at all times for such examinations, we cannot guarantee to be

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ready for making the cultures promptly, unless we are informed beforehand when the specimens are to be expected. If the physicians will inform us beforehand when the samples will arrive, we will endeavor to examine them all promptly and report as soon as possible. It takes several days to carry out the tests to determine whether or not the typhoid bacilli are present, but the report should in all cases be possible within five to seven days.

PREPARATION OF ENDOMEDIUM.

Our method of preparing Endomedium is as follows:

Water 1000 c.c.
Beef extract, 10 grams,
Peptone, 10 grams,
Salt, 5 grams,
Agar, 40 grams.

These materials are mixed together and the agar is dissolved by boiling. The mixture is then placed in a tall, large beaker and steamed for three hours in a steamer or autoclave. This is then allowed to cool very slowly, the medium remaining over night in the autoclave without opening. As the result of this slow cooling, most of the sediment will be collected at the bottom of the beaker. The next day the whole is removed from the beaker and the sediment layer at the bottom is cut off with a knife. This leaves the agar fairly clear and avoids the necessity of filtering, which is difficult in a solution that contains such a large percentage of agar. The material is now melted and by the use of normal HCL its reaction is adjusted to the acid reaction of 1 per cent.

The next step is to standardize the final reaction of the medium, which is done as follows: One hundred c.c. of the material above prepared is measured out and to it is added the following:

1 gram of lactose.
1 c.c. of a 5% solution of fuchsin.
2.5 c.c. of a 10% solution of freshly prepared sodium sulphite.

The above ingredients are added to the 100 c.c. of the agar solution and carefully dissolved, and then 10 c.c. of this material is placed in each of 10 test tubes. There is now prepared a 5% solution of Na_2CO_3, and to each of the test tubes, is added varying quantities of this solution, one test tube receiving .01 of a c.c., another one .02 and so on up to 0.1 of a c.c. of the Na_2CO_3 solution. After thoroughly mixing, the contents of the tubes are poured into Petri dishes and allowed to harden as usual, and then are streaked, each one alternately with a streak of colon bacillus and typhoid bacillus. The Petri dishes are then put into an incubator for 24 hours and allowed to grow and then examined side by side. By looking through the Petri dishes, one is selected in which there is the sharpest differentiation between the colon growth and the typhoid growth. Having determined which of this series of plates gives the best differentiation, this gives the best amount of the alkaline to be added to the whole quantity of the agar medium to give the proper differentiation. By simple calculation the amount of alkaline is determined that should be added to the whole mass of the agar medium already prepred and this quantity is added to the whole solution. The material may now be stored and kept indefinitely. It is most convenient to store this in small flasks or bottles which hold 100 c.c. each, carefully plugging each and marking upon the outside of the receptacle the point where the surface of the liquid reaches, indicating the 100 c.c. mark. The purpose of this is so that if later evaporation should occur the amount of the evaporated water may be replaced at any time. This medium is to be stored, of course, without the fuchsin

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and sodium sulphite added to it. It may be prepared in large quantities and kept indefinitely.

When it is desired to use any of the Endomedium, one of the bottles has the evaporated water replaced and then, after melting, there is added to it the sodium sulphite and fuchsin mixture above mentioned. The material is then ready to use at once. By preparing the agar medium in large quantities at one time, it is possible to keep Endomedium on hand ready to use for months without the necessity of making it fresh. Each lot that is made needs to have its reaction adjusted with a series of tests as above described, inasmuch as there are some difference in the reaction in each case and this should be carefully adjusted in order to give the best results. If prepared in this way, Endomedium may be constantly on hand ready to use at the shortest notice.

PREPARATION OF RUSSELL MEDIUM.

The preparation of Russell's medium as used in this laboratory is as follows: To a 2% nutrient agar, prepared by the ordinary method, add enough 5% aqueous solution of litmus to give a faint purple violet color. Adjust the reaction by means of normal NaOH to the neutral point for litmus. Add 1% of the lactose and 1% of glucose, dissolved in a little water; and pour 10 c.c. into an ordinary test tube. Place in an Arnold sterilizer, loosely packed, and steam for ten minutes on the first day, and fifteen minutes on the second day. After the last sterilization, slant the tubes so as to make a somewhat long slanting surface. After cooling store in a dark place.

The culture to be tested is stabbed into the slant tubes with an ordinary needle, incubated for 24 hours or longer at 37 degrees. The appearance of the tubes readily distinguishes the colon-typhoid group as follows: Colon itself turns the whole tube completely red with the production of gas bubbles. The typhoid bacillus turns the top, i. e., the slanting part of the agar, blue, while the portion in the lower part of the tube is turned red. Para typhoid decolorizes the medium, and the Gaertner's bacillus turns the agar from the top to the bottom of the tube a blue color. The reaction is very striking and the differentiation between these types is made with the greatest ease.

TABLE XI. MALARIA SPECIMENS.

	Classified			
	Positive.	Negative.	Uncertain.	Total.
1910-11	10	84	9	103
1911-12	2	106		108
Total	12	19	9	211

As shown by the accompanying table the percentage of positive readings of malaria is very small. Such a small number of positive cases convinces us that the laboratory examination of miscellaneous samples of malaria is of not very great practical value. We can hardly believe but what others of the specimens sent us came from true cases of malaria; for it is known that this disease is somewhat common in this state. But certain it is that the method of preparing and forwarding specimens to us which has been adopted does not prove to be very satisfactory. This is partly due to an improper preparation of the smears.

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In order to make satisfactory examination of blood, the blood must be carefully smeared upon the slide, according to directions sent out with the outfits. In spite of these specific directions, however, many physicians persist in putting the drop of blood upon one slide, and then simply squeezing it with another slide, tying the two together by a string. Such a method of spreading does not distribute the sample in such a way that the examination can be made. But, although this has been repeatedly stated to physicans, and careful directions for making the slides are given, we are in constant reception of samples prepared in this way. Examinations of such specimens, although we report them as negative, is practically useless.

It is a well known fact also that an examination of blood for malarial organisms, after a chill, will rarely give any positive results, inasmuch as it is at this time the organisms have left the corpuscles and cannot be found. Nevertheless, many of the specimens which are sent to us for diagnosis have been taken immediately after a chill, and, of course, the results are negative. In the ordinary practice of a physician, he will be naturally likely to take the blood from the patient at such a time as he finds it most convenient to make his visit, without any special reference to whether it is a proper period in the development of the disease for the specimens to be collected with the expectation of having the diagnosis of any value. Under these circumstances, a very large percentage of the samples sent us could not be expected to give positive results, even if the case was one of true malaria. At all events the small number of positive cases that we have found in the last two years, has convinced us that this part of our laboratory routine work is of small practical aid to the physicians. It may sometimes be of value in making possible the differentiation between malaria and typhoid fever, where the physician has an obscure case, and in such instances it is desirable for him to send samples to us for the examination of both of these diseases. We do not regard the examination for malaria, therefore, as of any great value.

TABLE XII. RABIES.

Specimens examined for Rabies.

	Positive.	Negative.	Uncertain.	Total.
1910-11	23	16		39
1911-12	11	7	1	19
Total	34	23	1	58

The number of specimens examined for rabies in the last two years has been less than in the previous two. All of the specimens examined were dogs, with the exception of two, one being the brain of a cat and the other that of a cow. Probably all of the positive cases are to be traced to three distinct centers. The first was that of a dog that wandered into this state, apparently from Massachusetts, and after roaming around in the eastern part of the state, was finally killed in the town of Cromwell and an examination proved it to be suffering from rabies.

For a few weeks following this examination, quite a number of specimens were sent to us from the portion of the state over which this dog had evidently been circulating, most of them being positive, and in all probability traced to this particular animal. After a few weeks, specimens from this focus ceased to appear and this particulr epidemic came to an end. Later a dog ran riot among other dogs in and near the town

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of Danbury, biting a large number of them before the dog was killed. The examination of the head of this animal showed it to be a case of rabies, and an attempt was made at once to confine the dogs that had been bitten by this animal, and in this way the further distribution of this epidemic was largely checked. Quite a number of secondary cases, however, followed the first one, and for some time afterward, new cases of rabies appeared in the towns in the vicinity of Danbury which were probably all directly traced to the first animal mentioned. A third epidemic appeared later in the vicinity of the town of Greenwich, resulting in another lot of animals which were killed and examined in the laboratory. Among all of the cases examined only in one or two instances have human beings been bitten by the animals under suspicion, and in no cases has any human rabies followed from the bite.

The method used in the laboratory for diagnosing rabies has not changed since we started this work four years ago. It consists in smearing a bit of the Ammon's horn from the brain upon a slide, staining with a mixture of methylene blue and rose aniline violet, and making a microscopic examination for the detection of the presence of *Negri bodies*. We have not made inoculations into animals for the purpose of confirming the microscopic test upon these animals. The reason why this procedure, which is common in some laboratories, has not been adopted, are as follows. In the first place, such inoculations require the keeping of considerable numbers of rabbits and guinea pigs on hand for experimental purposes, and we are not equipped with conveniences for breeding and keeping such animals in sufficient quantities for this work, the appropriation at our command making it impossible for us to rear animals in large quantities. Second, it has seemed to us that for the purpose for which our diagnosis is used, such an inoculation is practically useless. The particular value of the laboratory diagnoses of rabies is in quickly enabling an individual who has been bitten by a suspected animal to know whether the animal in question is really suffering from the disease, so that he may determine at once whether it is wise for him to take the Pasteur treatment for warding off the disease. The treatment by the Pasteur method becomes less and less efficient as time advances, and after two to three weeks, its value is extremely slight and finally becomes almost nothing. If, therefore, a specimen examined in the laboratory proves to be negative to microscopic examination, and a person who might have been bitten by such an animal should wait for a subsequent confirmation of this diagnosis by animal inoculation, when the result reached him after three or four weeks, it would be already too late to apply the Pasteur treatment with any likelihood of satisfactory results. Inasmuch, therefore, as animal inoculation gives no results inside of three or four weeks, we have regarded it as nearly useless for the practical purpose of directing a person who has been bitten by a suspected dog. For these reasons we have not regarded it as necessary to make confirmatory inoculations test of our microscopic diagnosis, and the reports that we have sent have been placed wholly upon the microscopic examination. We have had, however, no reason hitherto for questioning the results of this diagnosis. There have been no instances brought to our attention where a negative report from this laboratory has been thrown into doubt by any subsequent development. While we cannot rely upon miscroscopic examination as absolutely accurate, we are convinced that under the circumstances under which we are working it is the only diagnosis that is of practical value for the purpose for which specimens are sent to us. In the test made in other laboratories, it has appeared that there is about 5 per cent. of error in the results from the microscopic examination. In making our report of our negative cases, we always take occasion to call attention to the fact that there is a small chance of error in a negative report and that animals which we report

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as not showing the Negri bodies may possibly be affected with rabies. Under these circumstances we always advise that our negative diagnosis should be interpreted in the light of physical symptoms of the dog, and if a person has been bitten by an animal of which there is a strong suspicion of the presence of rabies, even though our laboratory pronounces the case to be negative, we should strongly advise the Pasteur treatment as a means of surety in guarding against the possibility of error. Fortunately during the last two years, there have been a very few instances where human beings have been bitten by suspected animals, and in all of these cases, there has been either distinct positive evidence of the presence of Negri bodies or there have been practically no reasons for suspecting the presence of the disease in the animal that has been bitten, the reason for suspicion, at all events, being so slight as to make our negative results simply confirmatory of the diagnosis made by the physicians who had charge of the case.

GONORRHEA.

The State Board has not hitherto regarded it as wise to have this laboratory undertake as part of its routine work the examinion of specimens sent for the detection of gonococcus. Occasionally physicians have sent us specimens of pus for such examinations and we have always made them gladly; but no outfits are prepared for this purpose, and as yet no announcement has been made to physicians that such examination is a part of the routine work of this laboratory. Only six specimens have been sent to us for examination during the last two years.

SYPHILIS.

There is developing rapidly at the present time an interest in the matter of the education of the public along lines of venereal diseases, and a large amount of public attention is being given to the wide distribution and the great prevalence of gonorrhea and syphilis. Most bacteriological laboratories undertake the diagnosis the gonorrhea as a regular part of their routine, and the diagnosis of syphilis is becoming more and more common in different laboratories. There has not as yet been developed a large demand in this state for such examinations, and the laboratory has not hitherto been in a condition to make the examination for syphilis. We believe, however, that it is only a matter of a short time when we shall be forced to undertake as part of our routine work an examination for both gonorrhea and syphilis, and that we shall very soon be obliged to furnish to the physicians of the state outfits for this type of diagnostic work. Certain unsettled questions concerning the most valuable method of diagnosing syphilis leads us to hesitate at present about undertaking this as a matter of routine in this laboratory. Apparently the best method of diagnosis depends upon a complement fixation test, similar to that which is described in a later page as in use at the present time at our laboratory for the diagnosis of glanders. When the time appears to be ripe for the introduction of this as routine work this laboratory will undoubtedly be in a position to undertake it.

TRICHINOSIS.

Two specimens of pork have been sent to the laboratory to be examined for the presence of Trichina. Neither of them, however, proved to be positive.

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EXAMINATION OF PUS.

Bacterial Vaccines.—During the past few years, there has been a very wide adoption of a method of treating certain types of bacterial diseases, especially those characterized by the production of pus, by what are known as bacterial vaccines or sometimes called bacterins. Bacterial vaccines are based upon a principle of an attempt to increase the phagocytic action of the white blood corpuscle. It is well known that certain bacterial diseases are resisted in the body by being absorbed by the white blood corpuscles (leucocytes) which attack and engulf the invading bacteria. This is particularly true of those diseases charcterized by the production of pus, pus itself being to a large extent the dead bodies of the leucocytes, that have been engaged in the conflict with the invading bacteria. It has been one of the valuable discoveries of late years that this power possessed by the leucocytes of absorbing bacteria can be very greatly increased by having the dead bodies of the bacteria in question injected into the tissues.

This method of enabling the body to combat invading bacteria has now passed beyond the stage of experiment, is recognized as a demonstrated means of fighting against bacterial diseases, and the last few years has seen a very rapid extension of this method of treatment, until at the present time, great quantities of these bacterial vaccines are sold and used in the medical practice. Bacterial vaccines are made by preparing bouillon cultures of the bacteria which produce the disease to be treated, and allowing them to grow until the bacteria are very numerous in the culture medium. After this, the life of the organism is destroyed by heating the culture medium to a temperature of 60 degrees C., varying slightly in time and temperature with different organisms. This temperature is found to be sufficient to destroy the life of the bacteria themselves, but not to destroy the products which have developed from them and which are the effective agents in stimulating the power of phagocytosis. These cultures, containing the killed bacteria, are then counted so that the number of the bacteria present per c.c. is known, and the material diluted with salt solution is then labeled with the type and number of bacteria present. This constitutes the bacterial vaccine, and the material is injected into the patient, under proper conditions, with the result of increasing his phagocytosis, and thus giving him an increased power of resisting the invasion of the micro organisms in question. This method of treatment, after being tested for a number of years, is recognized as a legitimate method of combating pus forming diseases. It is the principle that underlies the well known inoculation employed to-day so widely as a means of protecting against typhoid fever. The typhoid vaccine used as a guard against this disease, is nothing more than a culture of typhoid bacilli that have been killed by the method described. Its value in typhoid fever is as a preventive and not as a cure, but the same method is found to be very efficacious as a method of curing some other diseases, especially those that are produced by various coccus types of organisms. This method of treatment is especially valuable in cases characterized by a long succession of boils and abscesses following each other in succession and failing to yield to ordinary methods of treatment.

In order to be most efficient, however, the vaccine prepared needs to be of the same kind of bacteria that are producing the infection in the patient. It is known that there are at least three kinds of bacteria, and perhaps more, which are capable of developing pus, and may, therefore, be the cause of the type of troubles that are under consideration. In order that a bacterial vaccine should be efficient, it is necessary, therefore, that it should be composed of the proper type of organisms, since a vaccine prepared with one kind of bacterium will have no value in fighting a second type. The most efficient method of preparing these vaccines is to

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isolate from the pus of the patient himself the particular organisms that is producing the trouble in him, then to make a culture of it. Such an isolated strain is, of course, the special type producing the disease that it is desired to fight. Such a vaccine, made from the bacteria of the patient himself, is known as an autogenous vaccine, and is more efficient than a vaccine made in any other way. Quite a number of laboratories in this country are at the present time thus making autogenous vaccines for the use of physicians, for the treatment of pus forming and some other types of diseases.

Commercial Vaccines.—The commercial firms that put these vaccines on the market are now preparing vaccines in great quantities, although they do not commonly prepare autogenous vaccines, this usually being impractical because of distance and haste. They do, however, prepare vaccines made of Staphylococci or of Streptococci and of some other types of bacteria; and in order that the vaccine should be distinctly applicable to any particular patient, it is necessary, therefore, to know what type of organisms is producing the pus formation in the patient. These commercial firms also put up what they call polyvalent vaccines, which means vaccines made up of a mixture of the several kinds of bacteria that are known to be the common cause of the production of pus. A vaccine that has several kinds of bacteria present is very likely to contain the one which will be efficient in any particular type of pus forming disease. The use of these polyvalent vaccines is thus designed to meet all cases where the specific organisms is not known. It is, however, manifest that it is not desirable to use a polyvalent vaccine where it is possible to determine the exact type of organism present, and thus use a vaccine that is especially adapted to the particular case in question. To do this, it is, of course, necessary that pus itself be examined to determine whether the pus forming organism is one or another of the various types of bacteria known to be the cause of such troubles.

Pus Examination.—This development of bacteriology is throwing upon bacteriological laboratories a new kind of work for which there has been hitherto no call. Already there are signs that more up-to-date physicians are recognizing this as one of their aids in treating disease, and we are beginning to have calls from physicians for the examination of pus for the purpose above outlined, namely, to determine the type of organisms producing the disease. Such an examination is not a difficult one to make, and has readily been undertaken in this laboratory whenever it has been called for. It seems probable that the examination of pus for this purpose is one of the bits of routine that bacteriological laboratories will be called upon to do and as the use of bacterial vaccines extends, as their value is recognized by physicians, the demand for pus examination will undoubtedly grow.

Some public health bacteriological laboratories have also undertaken the preparation of bacterial vaccines, by the method above mentioned, regarding this as a work of public benefit that should be under the control of boards of health and their laboratories. Whether this is a legitimate piece of work for a public laboratory, will, of necessity, be determined by each board of health and regulated by the appropriations within its reach for carrying out such work. It seems to be quite clear, however, that the examination of pus for the purpose of determining the type of bacteria concerned in the production is a legitimate piece of the work of any public health laboratory. Such work cannot be done by an ordinary physician and can only be carried out in laboratories where there is proper bacteriological equipment. The lack of laboratories at the service of physicians at large for this purpose has made it apparently certain that a public laboratory, like that of the State Board of Health, should hold itself in readiness to aid physicians in this respect. It is true that

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the diseases in question are not in general contagious, and therefore it might be said that the examination of pus for this purpose would not serve any distinct public aim, since such examination had no special relation to the problem of public health, or in aiding health officials in checking distribution of epidemical diseases. Nevertheless, the growing recognition of the value of this kind of work, which can only be done in the bacteriological laboratory, makes it appear to be a legitimate call upon the labortory to make pus examination. During the last year we have made such examinations when we have been called upon to do so, although they have not as yet been numerous, and we shall continue to endeavor to meet these demands as long as the equipment and the force in the laboratory is sufficient to meet the requirements placed upon it, reserving at any time the right to refuse to make an examination of this kind if the work should become so extensive that it could not be properly handled consistent with the other work that the laboratory is undertaking.

GLANDERS.

Glanders is one of the longest known of diseases of horses, and occurs in nearly all parts of the civilized world. It is most commonly present in horses, asses and mules, occasionally occurring in dogs, swine and pigeons, and infrequently in man. It has been known even from the time of Aristotle, and that it was an infectious disease has been known for about 250 years. For 150 years, it has been recognized that the method of fighting the disease is by slaughtering immediately all infected animals and separating all suspected animals from others that are healthy. The cause of the disease is bacterium known as Bacillus mallei, which is one of the earliest bacteria discovered during the period of modern bacteriology. For mankind, this is a violently pathogenic bacterium, nearly always producing death, although fortunately it is rare that it develops in mankind.

The presence of a considerable amount of glanders among the horses in Connecticut has been recognized for some time, not only by the local veterinarians, but also by the Bureau of Animal Industry at Washington that has had occasion to study the conditions of this disease in our state. While no statistical data is at hand, it seems probable that at the present time the disease is on the increase. At all events it is so prevalent in the state as to make it extremely desirable that emphatic measures should be taken if possible to check its further distribution. During the last three years there have come various requests to this laboratory that we should undertake the diagnosis of this disease by laboratory tests. This laboratory, as originally organized by the State Board of Health, was established primarily to diagnose diseases especially related to human health and not those that concern domestic animals. It has been legitimately urged, however, that glanders, though primarily a disease of horses, is at the same time a disease which may find its way into man, and that the inhabitants of Connecticut are under more or less constant danger from the presence in our midst of large numbers of undetected cases of glanders. In the last few years, several deaths of human beings have occurred from glanders in this state, and this has further emphasized the fact that glanders is not simply a danger to horses but is a menace to human life all over the state. It is believed by some that a horse suffering from unrecognized glanders and driven about the streets of our cities, may, by the means of the discharges from its nostrils, be a means of directly infecting human beings who are unconsciously passing in the vicinity. Whether this is true or not we are not as yet sure; but it is certain that persons who are at work around horses in stables are subject to danger from this source, as is shown by the occurrence of fatal cases of the disease in the state.

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For all of these reasons it has been strongly urged that the diagnosis of glanders is a legitimate work for the laboratory of the State Board of Health, if it can be used for aiding the veterinarians in getting rid of this disease and thus protecting the human race, as well as the horses from this serious and usually fatal disease. The only satisfactory way known at present of fighting glanders is by the destruction of all horses that are infected, inasmuch as a cure of the disease is difficult and rare, and since all horses that come in contact with the infected animals are themselves very liable to become infected. A single infected animal in a stable may soon distribute the disease to all other horses in his vicinity and a very great loss result. As long as many cases of glanders are allowed to be at large in our state, there is no means by which the disease can be checked. If, however, these cases can be promptly detected and at once destroyed, or, at least isolated from contact with other animals, there is hope that the disease may be checked and perhaps entirely eliminated. To contribute toward this end is certainly a legitimate part of the work of the public laboratory.

Diagnosis of glanders.—The diagnosis of glanders is difficult, at all events in its early stages. Clinical symptoms are at first frequently obscure and liable to be confused with various other diseases. Positive cases are sometimes diagnosed as something besides glanders, and on the other hand, some animals that show extremely suspicious symptoms prove, by later development of the case, to be suffering from something besides glanders. Beyond question, many horses have this disease for a long time without showing any visible external symptoms, but nevertheless during the whole time they may be a menace to animals with which they come in contact. For these reasons, it is very difficult, or, indeed, impossible, to eradicate the disease if dependence is placed simply on clinical signs, for in many cases horses become a source of danger to animals and to men long before clinical symptoms of the disease are strong enough to convince veterinarians, and still less the owner, that he has a case of glanders, and that the animals should be destroyed. For these reasons, any laboratory assistance which will diagnose the disease in the early stage will be of very great value.

Methods of diagnosis, other than clinical:—There are several methods by which a laboratory may aid the veterinarian in diagnosing glanders, of which the following is a brief summary:

1. *The Strauss Test.*—This test is made by inoculating into male guinea pigs the pus discharged from suspected animals. A small quantity of the pus is diluted with a little sterile water and by a hypodermic syringe is injected into the abdominal cavity of the pig. The animal is then kept under observation for a month to determine whether they have become infected. If the pus contains glanders bacilli, the animals usually die inside of a couple of weeks, and then an examination is sufficient to determine whether they have died of glanders. Certain easy recognizable characters are usually seen in the post mortem examination, the most common of which is the swelling of the inguinal glands. Microscopic examination and cultures made from these swollen glands should, in cases of true glanders, reveal the presence of *Bacillus mallei;* and if this is found under these circumstances, it is proved positively that the guinea pigs have died of glanders and hence that the suspected horse had the disease. Occasionally, this test fails; sometimes the animals die quickly from septicaemia, and in other cases, where subsequent events shows that glanders was truly present in the animals, the guinea pigs resist the inoculation. While the test is of value and a positive result can usually be relied upon, it is not a test that can be depended upon when a negative conclusion is reached.

2. *The Mallein Test*:—Mallein is a material prepared from the glan-

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ders bacillus in much the same way as *tuberculin* is prepared from tuberculosis bacillus. The glanders bacillus is allowed to grow from six to eight weeks in a glycerine broth. At the end of this time, organisms are killed by boiling, and a small quantity of carbolic acid is added as a preservative. This product, after filtering, is *mallein* and is ready for use. A certain definite quantity of it is injected into the suspected horses and in case that they are actually suffering from glanders, the inoculation is followed by a rise in temperature, whereas in animals that are in good health, no such rise in temperature is found. The reaction is thus very similar to that of tuberculin as used in testing cows for tuberculosis. The accuracy of this test, however, appears less than the accuracy of the tuberculin test. Some animals that do not have the disease react under some circumstances, and while the method has been of considerable value, it has its limitations and is not always to be relied upon.

The Ophthalmo Test:—This test also consists in the use of mallein, but instead of being injected into the auimal, a small quantity of it is, by means of a camel's hair brush, applied to the surface of the eye. In case the animal is suffering from glanders, a purulent secretion is observed in the eye after 36 to 48 hours, and if this is absent it denotes a negative result. Experience in this country with this test indicates that it cannot be relied upon as very satisfactory.

The Cutaneous Test:—The third method of using mallein in diagnosing glanders is by applying it directly to the skin. The hair on the side of the neck is shaved so as to expose the bare skin, and then the strong mallein solution is rubbed over this surface, after it has been scarified, something in the same way that the skin is prepared for ordinary vaccination. The results of this test are less reliable than either of the others.

Blood Tests.—There are three different methods of testing an animal for glanders by the use of their blood serum. These tests have one manifest advantage over the others. The serum can be drawn from the horse without difficulty and without in the slightest degree incommoding the animal. The serum can then be sent to a laboratory where all possible facilities are at hand for carrying out the test. While the owner of the horse is waiting for the results of the test, the horse can be used in any way that seems to be wise, for it is not in the slightest degree incommoded by the drawing of the small quantity of blood necessary for the serum test. There are three of these blood serum tests for glanders, as follows:

1. *The Precipitation Test.*—This is based upon the fact that when the blood serum of a glandered horse is brought in contact with extracts made from a glanders bacillus, under proper conditions a precipitation of the glanders bacillus extract will appear. Glanders extract and the blood serum are brought together in a test tube and in positive cases a plain ring of precipitated material is found at the line separating the serum from the glanders extract. This method has not been used very much in this country.

2. *The Agglutination Test*:—This test is based upon somewhat the same principles as the Widal test that is used so commonly in laboratories for the detecting of typhoid fever. The blood of glandered horses contains certain substances, known as *agglutinies,* that have the property of agglutinating suspended glanders bacilli. The method of making the test is briefly as follows: Glanders bacilli are cultivated upon glycerine agar and allowed to grow for about forty-eight hours when a luxuriant growth is obtained. The cultures are then placed in a water bath where they are heated to 60 degree centigrade for two hours, for the purpose of killing the germs. The growth upon the surface is then washed off with a physio-

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logical salt solution to which 5% carbolic acid has been added. The fluid is then filtered through filter paper and diluted with a 5% solution of carbolic acid until a proper dilution for the test has been reached. The amount of dilution which is necessary to give a proper agglutination is determined by experiment, and it is customary to keep in the laboratory a solution of proper density. When a new quantity of agglutinating material is made, it is diluted until to the eye it appears to have the same density as that of the test fluid with which it is compared. This is the agglutinating fluid ready for use. In using it, the blood serum of the suspected horse is diluted with salt solution to varying amounts, ranging from 1 to 500 to as high as from 1 to 1,500 or 1 to 2,000. This diluted serum is then mixed with the agglutinating fluid in small test tubes and these are placed in a centrifugal machine, and centrifugalized 10 to 20 minutes according to the speed of the rotation. The test tubes are then removed, allowed to stand for one-half hour, after which the reading of the result may be made, although the reading is more satisfactory if made after standing twelve hours. In positive cases, the suspended bacteria will be agglutinated in clumps and thrown down to the bottom of the test tube as a thin veil or ring. In negative cases, however, there will be no agglutination, and the suspended bacilli will be precipitated by the centrifugal force into the bottom of the tube in a compact mass in center of the test tube. There is little difficulty in reading the reactions and determining promptly whether to report a positive or negative result.

This agglutination test is fairly satisfactory when properly performed; but it has its own sources of error. Sometimes horses that are not suffering from glanders show a fairly high agglutination, and all horses will show agglutination with a low dilution. Moreover in old and chronic cases of glanders it frequently happens that animals plainly suffering from this disease give no agglutination and this further interferes with the accuracy of the test. The method, however, of diagnosing glanders by agglutination is extremely useful and has been widely used. It is especially valuable when used in connection with the following test.

3. *The Complement fixation test.*—This test, which is the most recent of the tests for glanders, is somewhat difficult to understand and very difficult to explain. A few of the fundamental principles concerned in the test, however, may be advantageously given here as follows:

To make this test, five different ingredients are required. These are:

1. *Complement.*—In the blood of the guinea pig there is a substance, not well understood, but having certain peculiar properties and which is known as *complement.* To obtain it for this test, a guinea pig is killed and its blood is drawn in a dish and allowed to clot. After standing for about twelve hours the serum separates from the clot and this serum may be poured off, and is known as complement. Sometimes it is necessary to whirl this in a centrifugal to separate the serum from the blood clot, but ordinarily this is not necessary. Other blood besides that of the guinea pig contains complement, but this convenient animal contains it in larger and more uniform quantities than other laboratory animals and is, therefore, commonly used.

2. *Amboceptor.*—This is a substance prepared from the blood of a rabbit in the following manner: A quantity of blood is drawn from a sheep and then, by centrifigal force, the red blood corpuscles are separated from the serum and are carefully washed with a normal salt solution. A certain quantity of these red blood corpuscles are then injected into a rabbit. After a few days, a second larger quantity of corpuscles are injected into the same animal, and again, a third quantity later. The presence of these corpuscles injected into the rabbit causes certain, little understood changes to take place in the rabbits thus injected, the result of which is,

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that its blood after a few weeks contains a new substance which is known as *amboceptor*. After the rabbit has been kept for a proper length of time injected with the corpuscles as above described, the blood is drawn from the animal and allowed to clot. The serum that separates from the clot contains the *amboceptor* and may then, by proper means, be preserved indefinitely and kept on hand to be used whenever the fixation test is to be made.

3. *Antigen.*—This material is made from the bacilli which produce glanders. If the bacilli, which are the cause of this disease, are cultivated on agar medium as above described and then separated from the medium, placed in a liquid solution and by means of a mechanical shaking machine are shaken vigorously for several hours in succession, the bacilli are shaken to pieces and the solution will be found to contain certain ingredients that have apparently come from disintegrated bacteria. This substance, which is called the *glanders bacillus extract* or technically *antigen,* may then be preserved indefinitely without deterioration, and kept on hand in quantities for use whenever the test is desired.

4. *Sheep's Red Blood Corpuscles.*—The blood of a sheep is drawn from its jugular vein, shaken in a flask with beads to prevent clotting and then by means of a centrifigal force the red blood corpuscles are separated from the blood serum. They are next washed by being mixed with salt solution and again centrifugalized. There is thus obtained a quantity of the red blood corpuscles free from all of the liquid parts of the blood plasma and held in suspension in salt solution. This material must be prepared fresh whenever the test is to be undertaken, and for this purpose, a sheep must be kept on hand at all times ready to be bled.

5. *Blood serum of the suspected animal.*—This is drawn from the jugular vein in the horse and, if kept cold, may be preserved in proper condition for two to three weeks or even more without deterioration to test. If drawn in sterile vials it will keep so well that there is no difficulty in sending it to the laboratory in proper condition and in having it kept here on ice until the proper time comes for testing it.

In using these ingredients for the complement fixation test, the following principles are concerned:

Haemolysis—Complement, amboceptor, and sheep's blood corpuscles have such a relation to each other that under proper conditions, when mixed together, they will produce what is called haemolysis, a phenomenon described as follows: When red blood corpuscles of the sheep are are mixed with normal salt solution, they produce a somewhat opaque, red liquid. If this liquid is mixed with a certain quantity of complement as above described, no special change occurs; but if in the same mixture there is placed a certain amount of amboceptor, the complement appears to unite with the red blood corpuscles, the amboceptor appearing to serve as a medium for combining the two. When the red blood corpuscles and the complement unite together, the red corpuscles become dissolved and the opaque red liquid becomes a *transparent red.* This phenomenon of converting the opaque red into the transparent red is known as *haemolysis.* Briefly, then, it appears that *the presence of amboceptor can cause the sheep's corpuscles to combine with complement so as to produce haemolysis.* This is made very evident to the eye by the change in the appearance.

Fixation of Complement.—In the blood of a horse suffering from glanders, there is developed a substance, spoken of under various names but which we will here call as an *antibody,* a substance not present in a healthy horse. This substance has the power of combining with complement if there is present also a certain quantity of the material above mentioned under the name of *antigen.* As the result of this power, if there

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is present in blood serum a certain quantity of this glanders antibody and there is added a definite measured quantity of antigen, and also a measured quantity of complement, the three will combine together in such a way that the complement is wholly combined with the antigen, or, as it is said, it is *fixed.* By the term *fixation of complement,* we mean, therefore, that when we add to a small quantity of blood of a glandered horse, a certain amount of antigen and an equivalent amount of complement, the complement will be combined witn the antigen and the antibodies in such a way that *no free complement will be left in the solution,* i. e., the complement is all *fixed.* If the complement with the antibody should be added to the blood serum of a normal horse in which no antibody was present, the complement would have no means of uniting with the antigen and, therefore, would not become fixed.

Complement fixation test.—This test is based upon the facts above described and consists in determining whether the complement from guinea pigs will be fixed by the suspected blood. The assumption is, for reasons above described, that if this complement is fixed the suspected blood must contain the glanders antibody and the horse, therefore, must be suffering from glanders. If, on the other hand, the complement is not fixed, it indicates that the antibody is not present, and, therefore, that the horse is not suffering from glanders. To carry out the test, the following procedure is adopted.

A small quantity of serum of the suspected horse is mixed with a definitely measured quantity of antigen, and a definite quantity of complement. These two are then allowed to remain at a body temperature for an hour, during which time it is found by experience that the fixation of the complement will be complete, provided that the antibody is present in the suspected serum to bring about the fixation. At the end of this time, therefore, if the suspected serum is actually that from a glandered horse, the complement will be all fixed so that there is *no longer free complement in the solution.*

The next step is to determine whether the complement has been fixed or not; and to do this we make use of the above principle of haemolysis. To the solution which has been kept for an hour for the fixation of the complement as above described, there is added a definite quantity of the amboceptor and a definite quantity of the washed corpuscles of the sheep's blood. As above shown, if the sheep's corpuscles, amboceptor and complement are all together in a solution in proper proportion, they will unite together and haemolysis will result. If any one of the three ingredients is absent, no haemolysis will result. To the suspected serum, which has been treated as described, therefore, the addition of amboceptor and sheep's corpuscles is made, and then the material is allowed to remain for a proper length of time at the body temperature to determine whether haemolysis occurs. If there is any free complement in the solution, haemolysis will take place, because we have just added the amboceptor and the sheep's corpuscles. If, however, there is no free complement in the solution, the haemolysis will not occur. Inasmuch as we have seen that if the suspected serum contains an antibody it will use up all the complement, it will follow that in such a case, the complement will be all fixed, there will be no free complement left to combine with the sheep's corpuscles and amboceptor, and no haemolysis will occur. On the other hand, if the suspected serum was not from a glandered horse, there would be no antibody present to combine with the complement, the complement would still remain free and would be in the solution ready to unite with the amboceptor and the sheep's corpuscles to produce haemolysis. Hence after the mixture has stood for two to three hours, the determination of whether haemolysis occurs which is very easy to see by a glance at the test tube in which the test is carried on, tells at once whether the original

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serum was that from a glandered horse or not. If it was from a glandered horse no haemolysis results, but if the horse was not suffering from this disease haemolysis occurs.

From this very brief description of the complement fixation test, it will be seen that it involves the use of several ingredients; the *complement* from guinea pigs' blood, the *red blood corpuscles* from a sheep, the *amboceptor* manufactured from the blood of the rabbit, and *antigen* developed from the bacillus mallei by special method. All these ingredients have to be carefully tested and titrated, in order to determine their exact strength. After the material is on hand, however, the test is not difficult, although it takes considerable time. Of the materials above mentioned, the complement and red sheep's blood corpuscles must be prepared fresh each time the test is made; the other material may be kept on hand, and preserved until used.

Accuracy of the Test.—This is the most recent of the laboratory tests adopted for glanders. It has been used somewhat widely in Europe and has been extensively employed by the Bureau of Animal Industry at Washington. From the large amount of experience accumulated there as well as at other places, it has become plain that of all the laboratory tests for glanders, this is the most satisfactory and the most accurate. Like all other laboratory tests, however, under cerain conditions, the complement fixation test is not absolutely accurate, and while it can be relied upon in most cases, it is sometimes in error. In the first place when used to test the blood of suspected mules, it sometimes happens that an apparently positive reaction is obtained from the blood of mules that are not really suffering from this disease. For this reason, therefore, a positive report from the blood serum of a mule cannot accurately be relied upon unless it is confirmed by other means of testing. Apparently also the same statement may be made of the blood serum of ponies, that are found sometimes to give a positive reaction although the animals themselves are free from the disease. Again, if mallein, above described, has been used upon the animal a short time previous to drawing the blood for the complement fixation test, the result of the fixation test is likely to be positive, and under these conditions healthy horses sometimes show a positive reaction by the fixation test. Lastly, in a few cases of acute glanders, which run their course with great rapidity, it sometimes happens that the fixation test gives a negative result, although the animals are clearly suffering from this disease and indeed are nearly ready to die from its effects. The antibody which brings about the complement fixation does not seem to be developed rapidly in these acute cases, so that they sometimes give a negative reaction. To meet this last source of error, however, it is common to follow the fixation test with the agglutination test already mentioned. The substances which produce agglutination are developed rapidly in these acute cases, and the animals that fail to give the complement fixation test do commonly give a definite agglutination test. By combining the two, therefore, these acute cases are easily diagnosed. The agglutination test, however, as already has been mentioned, frequently fails to give definite and reliable results in the old chronic cases of glanders and these are picked out with almost unerring accuracy by the complement fixation test. When the two are combined together, therefore, the chance of error is practically reduced to zero. Where it is possible laboratories at the present time carry on the agglutination test parallel with the fixation test and between the two the results of the tests are very rarely open to error.

Glanders Test in This Laboratory—At the request of some of the veterinarians in the state, the State Board of Health authorized this laboratory to undertake the fixation test for glanders, provided satisfactory arrangements could be made. Correspondence with the Bureau of Animal

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Industry was started and that department offered to furnish us with the necessary amboceptor and antigen for making the tests. These materials are difficult and troublesome to make, and our laboratory is not in a position to undertake their production. It was possible for us to undertake this test only by having materials furnished us from Washington. Dr. Eichorn, of the Bureau of Animal Industry, visited this laboratory for the purpose of starting us in this work, and during the last six months, two visits have been made by the director to the laboratories at Washington for the purpose of getting additional information and experience concerning the details of carrying on the test.

With the assurance from the authorities at Washington that they would furnish us with necessary amboceptor and antigen, we ventured to offer to the veterinarians of the state, to carry out this test upon such samples of suspected serum as they would send to us. A letter announcing this was sent to the veterinarians and we have been prepared to carry out the fixation test since December, 1911. On account of the time consumed in the test and the limited assistance which we have in our laboratory, it has not been possible to make this test very frequently, and we have been able to offer to carry it on only twice a month, upon the first and third Thursdays of each month. It would, of course, be desirable to be able to make this test more frequently, but we are limited in our possibilities by the small number on the laboratory staff, capable of doing this work, and by the crowding of other work that is upon us at all times. Whenever the test is made, it requires the constant attention of one man for practically a whole day, and it has been found impossible to spare one of our assistance for this purpose more than once in two weeks. When this test is carried out it is possible, however, to make the test on a large number of samples at once, without taking much more time than would be required for one or two samples. We, therefore, can allow the samples that are sent in during two weeks to accumulate and treat them all at once. The largest number that we have tested at any one time has been forty and this, although taking somewhat more time than a single test, can be done very satisfactory.

In response to our circular letter at first a few veterinarians only were interested in the offer thus made, and only a few samples were received at the outset. As the months have gone, however, larger and larger numbers have been sent to us and at the present time we are receiving about forty per month. Up to the time of making this report, we have tested 317 samples, of which 105 have been reported as positive. Among these samples there have been two cases of human beings suffering from this disease, both of whom gave a positive reaction. Three specimens of mules have been examined and two specimens of blood serum from dogs.

We have been fortunate enough to compare our results frequently with those obtained from Washington of samples of blood from the same horses taken at essentially the same time. With two exceptions, our results agreed with those obtained at Washington. These two exceptions were cases where our examination seemed somewhat doubtful to us, but we gave, probably unwisely, a definite report rather than giving a doubtful report as would have been a wiser course. In one of these cases, the test made at Washington was reported as positive, while we reported the case as negative, and in the other case there was the opposite result. With these two exceptions, however, there has been no disagreement between our results and those obtained at Washington. The fact, however, that there was this little discrepancy led to the second visit of the director to the laboratory at Washington to obtain, if possible, more details concerning their methods, and especially concerning their reading results. It is expected that hereafter, the results that we shall obtain here will be essentially identical with those that would be reported at Washington,

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and, indeed, it is difficult to see how there should be any difference in the results, inasmuch as the same antigen and amboceptor are used here as are used in the labortory at Washington, and our methods are identical.

Previous to our undertaking this test, the Bureau of Animal Industry in Washington made tests for veterinarians in this state when requested to do so. It is, however, the policy of the department at Washington to make these tests only in the states where local laboratories are not equipped for the purpose. Having thus established the work in our laboratory and agreeing to furnish us with necessary material for the test, the department at Washington has decided now that it will no longer carry on these tests for the veterinarians in the state of Connecticut. When, therefore, samples are sent to Washington at the present time, the senders are referred to this laboratory, and hereafter veterinarians in the state will have to depend upon the State Laboratory rather than the Bureau Laboratory in Washington for the glanders test.

Up to the present time, we have been unable to introduce any general comparison between the results of our laboratory test and the clinical diagnosis as finally determined by veterinarians. Two of the veterinarian surgeons in the state who send us the largest number of specimens, have been, however, kind enough to furnish us with some data upon this matter; and while, as yet, such data is incomplete, we feel justified in reporting that the results of the laboratory diagnosis agree with close accuracy with those of the clinical diagnosis.

Glanders Outfit.—The outfits which we distribute to the veterinarians for the purpose of sending serum to this laboratory are ordinary diphtheria outfits, except that in place of the test tube containing the swab we enclose a sterilized homeopathic vial, which the doctor is requested to fill with the blood, or preferably with serum of the suspected horse. Sent in this fashion, the serum reaches us in good condition and we have no difficulty in making satisfactory tests.

A little trouble has occasionally been experienced in receiving samples from doctors not in proper condition for examination. Some of the veterinarians have placed carbolic acid in the samples that have been sent us to prevent decomposition, and this has sometimes interfered with the definiteness of the test. If a small quantity of carbolic acid is used in the serum it will not interfere with the result, but if a larger quantity is used, the reading of the fixation test becomes unreliable. Moreover, if carbolic acid is added to the blood itself instead of to the serum, it completely destroys the possibility of an accurate test. Some veterinarians, not understanding this, for the purpose of better preserving the serum in hot weather, have added carbolic acid, and in some cases have added too much, so that is has been impossible to obtain accurate readings. Inasmuch, however, as experience has shown that when drawn in sterile vials and kept cold the serum can be preserved for two to three weeks and still be in good condition for the test, there is no need of having any carbolic acid added to it, even in warm weather. The veterinarians are, therefore, requested to send the serum to this laboratory without any preservative, sending it promptly so as to reach us as quick as possible, and allowing us to place it at once upon the ice where it will keep in proper condition until we have an opportunity to use it.

The number of requests for testing suspected cases of glanders has been constantly increasing since we announced that we would undertake the test. Beyond any question there is quite an amount of glanders in the state, much of it consisting of obscure cases that cannot be easily recognized. It is of manifest advantage to the owners of horses as well as to the public health of the state that all such cases be detected as early as possible.

The method of getting rid of glanders which is recommended by the

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Bureau of Animal Industry as the only efficient means is based upon a thorough testing of all the horses in a stable where the disease has made its appearance. Whenever a single case of glanders appears in a stable the only safety for the herd is to have all of the animals tested immediately by the complement fixation test and thus detect those that are infected with this disease. Having discovered those that react to this test, the animals in question should be at once slaughtered, or at all events removed entirely from all contact with other animals in the herd. In this way, all animals at that time infected may be removed from danger of contaminating the rest of the stable. This test should be followed by another about three weeks later, for the purpose of confirming the first, and if then no further reactors are found, the stable may be regarded as free from disease. It requires some courage on the part of horse owners to slaughter animals that appear to be sound, simply because the laboratory test has shown that they have the poison of glanders within them, but this is the only efficient method of combating this disease which has proved so serious in various stables, and which it is eminently a matter of economic wisdom for the owner of horses to eliminate from his stable. Some Connecticut owners have already made use of this method of cleaning up their herds and have sent us samples to test from large numbers of animals at the same time. Where this has been done, we have hitherto found one or two cases of positive reactors in such stables.

MILK EXAMINATIONS.

The number of specimens of milk examined during the last two years has been 7,714, and these have come from every part of the state. Five of the largest cities in the state have now instituted a private milk inspection with private milk analyses. With these exceptions, all of the larger cities and towns and many of the smaller towns are sending us samples of milk for examination more or less regularly. A few of the small villages, where there are only a few inhabitants, have no real milk dealers and these have naturally not made use of this laboratory for milk analysis. But with this exception the interest in the examination of milk has extended until practically the whole state is now covered by means of the work done at this laboratory. The most satisfactory result of this work has been the development of an interest which is manifested in many parts of the state as the result of the work and reports upon the examinations which we have made. This interest has been manifested by correspondence, by a greater willingness on the part of different health officers to respond to the suggestion that milk samples should be collected for examination and by frequent requests for information concerning the meaning of our examination and our report. When we began this work four years ago, there was practically no attention paid to the quality of the milk sold in the State of Connecticut, except in two or three of the largest cities. Now there is hardly any part of the state that does not have at least a semblance of milk examination, and the whole state is, therefore, now under a certain amount of control as to its milk supply, even in the smaller places. There has been a constant increase in the number of towns that have appointed regular inspectors, and the health officers in nearly all of our towns where there are no regularly appointed milk inspectors have been glad to act in this capacity.

Purpose.—A brief statement concerning the purposes of these examinations may serve to correct a certain amount of misunderstanding in regard to them. It is not the primary purpose of our work to detect and punish instances of fraudulently adulterated milk, although this is, of course, one of the important results of this kind of inspection. The primary purpose of our examination is of a different nature. All health officials are perfectly aware that carelessness in the production of milk,

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which allows the entrance into it of undesirable bacteria, is more likely to produce illness on the part of those consuming the milk, than is the simple watering or skimming of the milk, or even the adding of preservatives. The adding of a little extra water, while it dilutes the milk and cheats the person from the financial standpoint, does not necessarily, nor indeed frequently, injure the quality of the milk except to give it a little less food value; and the robbing of the milk of a little cream, while it decreases its food value, it does not materially render the milk unhealthful. On the other hand, the presence of undesirable bacteria in large numbers has a direct effect upon the health of those drinking the milk. Undesirable bacteria are, therefore, a matter of more importance from the standpoint of health than is the simple adulteration of milk with pure water, or even the robbing it of a part of its fat.

The primary purpose of our examinations has been to bring about a greater care in the method of producing and handling and distributing milk from the varied dairies in our state. While it is true that there are some dishonest dairymen and milk dealers, who will water their milk if they think they can do so without detection, it is on the other hand true that the great mass of our milk producers are honest and are desirous of producing as good quality of milk as they can under the conditions that are forced upon them. Many of them, however, are ignorant as to the meaning of carelessness and the danger from dirt, and for these reasons fail to produce a type of milk which is of a character that can be recommended and which should be sold to be used for food. It is the primary purpose of the work of this laboratory to reach this large majority of dairymen, who are not intentionally dishonest but whose milk, either through ignorance or carelessness or both, is not up to the proper standard. No matter how honest a milk producer may be, it is a matter of human nature that he will be more careful in the production and handling of his milk if he knows that the milk is liable to be sampled at any time, examined in the laboratory, condemned as produced under careless conditions or commended if produced in such a way as to give an ideal product. If he feels that no one pays any attention to what he does with his milk and no one especially notices its quality, unless he should chance to adulterate it, it is simply a matter of human nature that even most honestly intentioned milk producers and distributors will become careless in their methods. This has been the condition in the milk industry in practically all the towns in the state with the exception of one or two of the larger ones, previous to our undertaking this attempt at a state-wide milk inspection. The primary purpose of our work, therefore, is to introduce as widely, as possible, an inspection of milk the state over, such that each producer in the state may realize that his milk is liable to be sampled any day, sent to the laboratory and analyzed, and that a report will come back to him to indicate the condition under which he has been producing this product that he is selling to the market. Nine-tenths of the milk producers and milk dealers of the state will be more careful in their methods when they know that they are likely to be watched. Our purpose, therefore, is not primarily to detect dishonesty in adulteration of milk, but rather to produce an increased care in the production and handiing of the great mass of milk that is produced by honest dealers and consequently placed upon the market as a good product. The matter of detecting fraudulently adulterated milk is primarily in the hands of the State Dairy Commissioner. While this is one of the purposes of our analysis, it is not the primary one.

Plan.—This plan of attempting a state-wide examination of milk from the central laboratory is new with this state, and inasmuch as it has attracted considerable attention in other parts of the country, a brief summary of our method of procedure may be of interest. The first step in

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this work was to have the local Health Officers in the various towns and boroughs in the state recognize that unless there were other special milk inspectors appointed, they were *ex-officio* authorized to act in this capacity. Correspondence and conference with the various Health Officers resulted in nearly all of them recognizing the importance of this work and agreeing to co-operate in carrying it on. Our laboratory then had made a number of milk shipping cases, designed to hold, some four, others six, and others twelve half pint milk bottles, so arranged that the bottles can be readily surrounded with cracked ice and shipped by express without difficulty. These milk shipping cases are kept constantly en route between this laboratory and the various towns in the state. We send them, having previously given notice to the Health Officer of their coming, with as great regularity as possible to the different towns. The Health Officers or milk inspectors, collect half pint samples of milk from the distributors in towns, place them in the shipping cases, surround them with ice, and ship them by express back to this laboratory. As soon as a case is received and emptied, it is started again to another locality to be refilled and returned again. In this way we keep all of our cases constantly stirring around the state, and endeavor to send them as frequently as possible to the various townships, sending them more frequently to the larger towns, and less frequently to the smaller. With a number of towns in the state that we have thus to serve in this way, we have found it possible to cover the whole state only about three or four times a year. The larger towns, however, receive cases more frequently than this. It is always our plan to give notice by postal card to the Health Officers a few days before cases are to be shipped, so that if they are not in position to attend to it promptly at that time they can notify us and enable us to send the case elsewhere. At the time the shipping case is sent to the Health Officers, a notification is also sent to the County Health Officers, this procedure being found an aid to us in keeping our cases rapidly moving.

In addition to the shipping cases that are owned by the laboratory, quite a considerable number of towns have found it advantageous to procure their own shipping cases. These they can keep constantly in their own possession and use whenever they deem it wise. There have been about twenty-five different towns in the state that have thus secured cases of their own. Whenever these are received in the laboratory, they are emptied and returned at once to the town that sent them. In this way, these towns have in their possession shipping cases at all times which they can use without waiting for a return case to be sent from this laboratory. These towns that own their own cases ship milk to us more frequently than others, some of them sending it regularly once a week, others, once in two weeks, and occasionally some of them even more frequently than once a week.

By these means we are able to keep in fairly close contact with the different towns in the state if the Health Officers respond to our shipment promptly and return the cases to us speedily. In spite of all of our attempts, however, we are still somewhat thwarted in giving the most efficient service by certain of the Health Officers who detain the cases in their possession for a long period after having received them. We have only a limited number of these cases and when one officer retains a case for several weeks, and sometimes for months, it deprives the rest of the state of its use. In spite of all of our attempts, it has been impossible to correct this tendency, and at least in one case the Health Officer has been so delinquent in sending the cases back to us that we have been obliged to refuse to send him our cases for the future. In spite of this difficulty in getting our cases back, it can be seen from the number of samples that we have received and analyzed, that we have found this plan

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very efficient in placing into the laboratory specimens in large numbers from various parts of the state, and we feel that this method of state inspecion, though not as efficient as it might be if we could do a larger amount of work, is fairly satisfactory in keeping a general oversight over the milk of the smaller places, and thus instituting a guard of some value over this important product so widely used, especially by children.

Age of Milk Received.—The milk shipping cases are returned to us by express, except from one or two towns where they may be brought in directly. They usually reach this laboratory in the afternoon of the day that they are collected by the milk inspector, occasionally, however, not reaching us until the following morning. The samples which we receive, therefore, are from twelve to twenty-four, or sometimes thirty-six hours of age at the time of receipt. It might be supposed, that being thus old, the results of our analysis would show a very marked increase in the number of bacteria and high bacterial counts, inasmuch as it is known that bacteria increase rapidly with the age. Our plan, however, of thoroughly surrounding the samples with cracked ice and shipping them in this condition has been found to be so effective that we have practically discovered that the samples that reach us twenty-four to thirty-six hours after collection show a bacteriological analysis of low grade when the milk was in proper condition at the time of collection. Indeed, the bacterial counts that we obtained, and which are shown below, are so low as to convince us that there is practically no bacterial growth during the hours of shipment. At all events, an examination of the tables given below will show that the milk we have analyzed is in a very good condition as concerns its bacteriological contents. We know that milk from these same localities is shipped to New York City and is not much if any older by the time it reaches that city than the samples which we receive in this laboratory; but our analysis indicates a far more satisfctory bacteriological standard than that which New York City reports. We attribute this to the thorough cooling of the samples that are shipped to us in ice, and while we recognized that it might be possibly better if we could analyze the samples immediately upon collection, we have every reason to believe that the analyses that we make are so close to those that would be obtained if the milk were analyzed at once and that there is no considerable error elapsing from the few hours between delivery and receipt at this laboratory. In summer weather a few samples which fail to reach us upon the day they are collected and are *not properly packed in ice* are so warm by the time that they reach us on the following day that we have not regarded bacteriological analysis as reliable. As a rule, however, even those specimens reaching us the second day have given a satisfactory bacteriological analysis.

Tests Made.—The tests that we make in the analysis of milk are as follows:

Bacterial Count.—This is made by the ordinary method, using agar plates, incubated at 37 degrees for forty-eight hours, by the method recommended by the Commission of Standards.

Fat.—The determination of fat is made by the Babcock tester.

Dirt.—Our method of detecting dirt has been in the past, simply to examine the amount of dirt that collects at the bottom of the bottle after milk has stood for a proper period. This method does not give any quantitative results, only enabling us to distinguish between milk *without dirt,* that with *slight dirt* and that with *much dirt.* Quite recently, we have adopted a totally different method. By means of a quick filter, known as the Wizard milk filter, we filter the samples of milk which we receive through a cotton disk. This disk is dried and returned to the Health Officer upon the individual report which is sent with each sample of milk. The disk is then given to the producer or the dealer, who can thus see

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directly the amount of dirt that has been filtered out of the sample of milk which has been sent by him. This graphic method of presenting to the dealer or the producer the knowledge of the amount of dirt that is present in his milk, is by far the most valuable means of demonstrating to the producer the necessity of care. This plan which we have only just adopted, has been found in places where it has been used to be an extremely efficient method in producing a better protection of the milk supply from dirt contamination.

Watering.—Our method of testing whether milk has been watered is by the refractometer. We use copper sulphate for curdling the milk and after filtering the milk serum, test the refractive power of the milk serum by the refractometer. Under these conditions, a reading of the refractometer below 36 indicates water and anything above 36 indicates normal milk. We have made a number of tests to determine whether the number 36, as recommended for the boundary line between watered and unwatered milk, is accurate.. As a result of our test we can say that we have found no instance where normal milk reads below 36, and we are, therefore, convinced from our data as well as that of others, that any milk reading below 36 has either been accidentally diluted or intentionally diluted with more or less water.

Specific Gravity.—As a rule, we have not made the specific gravity test, although this has been done where requested. The reason for this is because the refractometer test is a more accurate indication of watering since as the specific gravity test can be modified by dishonest dairymen, who can both water and skim his milk and at the same time do this so skillfully as to enable it to pass the specific gravity test at a normal figure. The refractometer test is not capable of being thus modified and we have regarded this as so much more reliable indication of watering that we have used it alone in our work, unless we have been requested to make the specific gravity test.

Disease Germs.—We have been requested several times during the past few years to make examinations of milk to determine whether it contains tubercular bacillus, and at other times whether it contains typhoid germs. Neither of these tests are practical at the present time in our laboratory. To make a test for tuberculosis requires the inoculation of guinea pigs; and no results can be obtained for several weeks after the guinea pigs are inoculated, for it is only by determining whether they die of tuberculosis that we learn whether the milk originally contained the germs of this disease. We neither have the time nor the equipment for carrying on such work, and while it would undoubtedly be desirable to determine to what extent the milk in the state is infected with tuberculosis bacillus, this work is not feasible for us at present. Nor is it practical to make an examination of milk for the purpose of determining the presence of typhoid bacillus. Even if these should be present it is practically impossible to detect them by a laboratory examination, although some laboratories claim that this has been done in some instances. Where such requests are made to us, we inform the person sending the sample that a practical test for the presence of typhoid bacilli in milk has not as yet been developed and such an examination cannot be made. In a few instances, by special request, we have made examinations of milk for such a purpose but have never succeeded in finding any typhoid bacilli.

B. colon.—Some public laboratories that examine milk make a test to determine the presence of *B. colon.* While the presence of this bacterium does not have the significance in milk that it does in water, it does indicate a condition of carelessness. *B. colon,* which is present in milk, comes probably, in most cases, if not in all, from manural contaminations, and the presence, therefore, of considerable numbers of this organism always indicate carelessness in the production of milk. Hence some labo-

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ratories are insistent that an examination for *B. colon* is of extreme significance in the attempt to control the public milk supply. We have not as yet adopted this test in our laboratory, although it is an extremely easy test to make. Our limited facilities, however, for such work and the large number of samples that we have had to examine, make it impossible for us to carry out these additional tests.

The following tables give the report of the milk examination made during the last two years:

TABLE No. XIII.

Milk Samples from October 1, 1910, to October 1, 1911.

Town.	No.	Town.	No.
Ansonia	29	Manchester	6
Baltic	22	Marlborough	18
Beacon Falls	11	Meriden	56
Berlin	24	Middlebury	6
Bethlehem	8	Middletown	799
Bethel	6	Milford	22
Bozrah	14	Naugatuck	10
Branford	31	New Canaan	12
Burlington	8	New Hartford	12
Canaan	12	New Milford	24
Chatham	16	New London	576
Cheshire	16	Norfolk	10
Clinton	6	North Haven	22
Colchester	8	Norwalk	6
Collinsville	28	Norwich	107
Cornwall	15	Old Saybrook	9
Coventry	5	Plainfield	10
Danbury	18	Plainville	5
Danielson	13	Putnam	293
Darien	12	Rockville	190
Derby	12	Saybrook	14
East Granby	4	Salisbury	4
East Haddam	3	Seymour	12
East Hartford	8	Sharon	10
Easton	18	Shelton	9
East Windsor	16	Somers	4
Ellington	18	Southbury	3
Enfield	17	South Norwalk	79
Fairfield	17	Southington	18
Glastonbury	15	Stafford	6
Goshen	4	Stafford Springs	16
Greenwich	26	Stamford	7
Griswold	28	Stonington	50
Groton	2	Stratford	24
Guilford	5	Tariffville	10
Hamden	21	Terryville	12
Hebron	16	Thomaston	10
Huntington	12	Thompson	15
Killingly	6	Torrington	107
Litchfield	11	Uncasville	11
Lyme	14	Wallingford	24
Madison	9	Washington	4
Mansfield	20	Westbrook	8

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Town.	No.	Town.	No.
West Haven	3	Winsted	215
Weston	2	Woodmont	11
Westport	18	Woodstock	8
Wethersfield	10	Yantic	2
Willimantic	16		
Windsor	17	Total	3,575
Windsor Locks	9		

Of the above, 69 samples were cream.
Of the above, 30 samples were skim milk.
Samples below legal standard for fat 181
Samples 7 per cent. and over 105
Samples showing added water 65

Table No. XIV.

Bacteriological Analysis.

Bacteria Count.	No. Samples.
50,000 and under	2,486
50,000 to 100,000	261
100,000 to 500,000	531
500,000 to 1,000,000	96
Over 1,000,000	119
Bacteria not counted	82
	3,575

Table No. XV.

Milk Samples from October 1, 1911, to October 1, 1912.

Town	No.	Town	No.
Ansonia	29	Ellington	18
Baltic	30	Enfield	37
Beacon Falls	16	Essex	14
Berlin	30	Fairfield	16
Bethlehem	4	Glastonbury	29
Bethel	30	Greenwich	60
Bozrah	18	Griswold	24
Branford	30	Groton	3
Bristol	52	Guilford	21
Brooklyn	5	Hamden	24
Canaan	8	Hebron	15
Chatham	17	Litchfield	13
Cheshire	20	Lyme	22
Clinton	10	Madison	10
Colchester	12	Mansfield	8
Collinsville	48	Manchester	12
Cornwall	19	Marlborough	30
Coventry	7	Meriden	4
Cromwell	26	Middletown	841
Danbury	24	Milford	36
Darien	17	Naugatuck	37
Derby	18	New Britain	50
East Granby	10	New Canaan	11
East Haddam	11	New Hartford	12
East Windsor	22	New Milford	23

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Town	No.	Town	No.
New London	574	Stratford	43
Newtown	6	Tariffville	22
Norfolk	11	Terryville	13
Norwalk	34	Thomaston	28
Norwich	241	Thompson	17
Old Saybrook	9	Torrington	137
Plainville	6	Uncasville	8
Putnam	297	Wallingford	30
Ridgefield	4	Westbrook	8
Rockville	161	West Hartford	2
Saybrook	14	Westport	29
Seymour	16	Willimantic	6
Sharon	8	Willington	13
Shelton	17	Wilton	10
Somers	4	Windsor	29
South Norwalk	53	Windsor Locks	30
Southington	30	Winsted	222
South Windsor	15	Woodmont	4
Stafford	6	Woodstock	18
Stafford Springs	30		
Stonington	48	Total	4,139

Of the above, 89 samples were cream.
Of the above, 31 samples were skim milk.

Samples below legal standard for fat	231
Samples 7 per cent. fat and over	101
Samples showing added water	76
Samples tested for preservatives	4

(Of these samples two contained formalin.)

TABLE No. XVI.

Bacteriological Analysis.

Bacteria Count.	No. samples.
50,000 and under	2,881
50,000 to 100,000	242
100,000 to 500,000	667
500,000 to 1,000,000	85
Over 1,000,000	198
Total	4,139

From the above tables, it will be seen that so far as concerns bacterial analysis, the milk of Connecticut is of fair quality, and, indeed, if the results which we have obtained are compared with those of larger cities, like New York and Washington, it will be seen that our milk is, from a bacteriological standpoint, very much superior to that which is sold in larger cities. We have found in Connecticut during the last year 79% of our samples analyzing under 100,000 bacteria per c.c. When this is compared with a city like Washington, where the number of samples below 100,000 is less than 34% and the average count for the month of September is 34,000,000 per cu. cm., it would seem at first sight that the milk of our towns is vastly superior to that which is on sale in the larger cities. This, however, is an incorrect deduction from the data. The milk which we have obtained has been, for reasons above described, kept distinctly cool and when analyzed in our laboratory, while not always strictly fresh, is quite cold. It is certainly true that this milk contains

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fewer bacteria than the milk of larger cities, but this same milk if transported to the larger cities, under the ordinary condition of railroad transportation and treatment would have numbers far greater than those that we have found, and inasmuch as it is known definitely that it is not so much the number of bacteria as the kind that determines the healthfulness of the milk, it does not follow, because our milk has a lower bacterial analysis than the milk of the cities, that it is, therefore, to this extent superior. The dairy inspector who visits dairies in different parts of the state reports that, on the whole, he finds the conditions of those dairies which send milk to New York City, superior to those of the other dairies in the state that send the milk to their neighboring towns and cities. From this we have to conclude that our milk is not superior to that of the larger cities except that it is somewhat fresher and has been *kept cooler* previous to the time of laboratory analysis.

Reports.—To each milk inspector or health officer sending samples, we return a report upon all the samples sent at any one time. In addition to this he is sent individual reports of each sample of milk which are to be placed by him in the hands of the individual producers or dealers. We also send to the Dairy Commissioner in Hartford, notices of all samples analyzed which contain added water or preservatives. The purpose of furnishing these to the Commissioner is to enable him to learn of dealers or producers whose milk is under suspicion and thus guide him as to places where he shall make further inspection and examination for the purpose of prosecution of those who are fraudulently selling milk upon the market. The commissioner follows up these reports and in many instances prosecutions and convictions have followed from the reports which we have sent.

As already indicated, since it is not the primary purpose of our work to detect fraudulent dealers but to improve the character of the milk, reports that we send for the different producers, are probably the most valuable of our reports. These are placed in the hands of the producers or dealers where they will be most significant and will do the most good. Experience has shown that even careless dairymen and dealers, who at first pay no special attention to the reports that come back to them, after a little become interested in these reports, as they learn from them the nature of the milk that they are distributing. Letters keep coming to this laboratory from different producers asking for an explanation of the reasons why their milk did not give better results and what they can do to improve the condition of things. The development of such an interest is in itself a sufficient indication of the value of the work which has been carried on in this line in the laboratory in the last two years.

The interest that has been developed and the questions that have reached us, as well as others coming to the Dairy Commissioner, have led during the last year, to the publication of a little pamphlet for the purpose of answering the specific questions that come to us in this way. This pamphlet was published with the co-operation of Mr. H. F. Potter, the State Dairy Commissioner, and is now being distributed over the state, a copy of it being returned to every dealer from whom a sample of milk has been analyzed in this laboratory together with the report sent back to him. This circular contains a brief outline of such practical suggestions as can be made to a dairyman for improving the grade of milk which he is producing without materially raising its cost. This pamphlet has been published in quantities sufficiently large for wide distribution, and any milk inspector or health officer who desires copies of this report for distribution among milk dealers and producers can have them in as large quantities as he desires for this purpose, by applying to this laboratory, or to the State Dairy Commissioner at Hartford.

Value of Bacteriological Analyses.—The question not infrequently

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arises as to the value of bacteriological examination of milk. While this is not a place to attempt to discuss this question, the following facts are, at least, of interest and suggestive. The director of this laboratory has been, during the last two years, a member of the National Commission of Milk Standards, a commission organized for the purpose of determining standards of milk that may be sold in this country, and also the conditions under which milk should be produced. The work of this laboratory has been incidentally presented before this commission at various sessions and forms part of the data upon which that Commission has arrived as to its conclusions. Among the important conclusions of this Commission, published in the spring of 1912 and bearing upon the general milk problem, are the following:

1. Milk may be good food for adults and perfectly harmless to them and yet be unhealthful food for babes and without doubt a number of diseases, including tuberculosis and diarrhoeal troubles, are distributed among children through milk, though rarely, if ever, to adults. The problem of producing a milk that is fit to feed to children is quite a different problem than that of producing milk to be safely used by adults.

2. The proper guard of the milk sold in the country requires that different grades of milk should be recognized based upon quality, each grade having a different market value. The milk commission has tentatively set forward certain grades to be used for this purpose and in determining those grades, always uses a bacteriological standard.

3. The great importance of bacteriological analysis of milk samples has been emphasized by this Commission. By a unanimous vote the Commission has concluded that *of all the methods of analyzing milk that of bacteriological examination conveys the largest amount of information concerning the general nature of thte milk, the care under which it is produced, and distributed, as well as its healthfulness.* This Commission believes, therefore, that data obtained from such examination is of much more value than the data obtained from chemical analysis.

4. While it is thus recognized that bacteriological analysis is of extreme value in determining the quality of milk, it is difficult, or impossible, to set any bacteriological standard that shall be of equal value in large and small communities. The milk distributed in large cities is on the average, older since it has a much longer transportation than that delivered in the smaller ones, and this inevitably produces the higher count, even though the milk was originally of equally good character. As a result, a bacteriological standard, which would be difficult to reach in a large city, where milk has been transported over a railroad journey for a considerable number of hours, could be reached with a very great ease in a smaller community, and, indeed, would be reached by almost any kind of milk that would find its way into these smaller towns, even from inferior dairies. If, therefore, a bacteriological standard is set which would be of value in a small community, it would be beyond the reach of a large city; whereas if one is set that is of value in the large cities, it would be valueless in the small towns, since it would allow almost any samples of milk to be sold. If, therefore, a bacteriological standard is to be required it must be graded according to conditions. For example, the last legislature in this state adopted the standard of one million bacteria per c.c. This standard may be reached with the very greatest ease in all of the towns in the state, and beyond question in the ordinary small communities, much milk which passes this standard may have been produced under careless conditions, have been carelessly handled or may be too old for proper sale. Hence this standard of 1,000,000 bacteria is no incentive whatsoever, to dairymen furnishing small towns to increased carefulness in the handling of the milk, because it can be reached without any special care; and emphasis upon such a standard would decrease,

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rather than increase, the attention which is given by the dairymen and the milk producer to furnishing satisfactory products. From the figures given in the table above, it will be seen that the dairymen in Connecticut would have no difficulty whatsoever in producing milk with a bacterial content far superior to that of the standard set by law, and in our communities milk with bacteria above this standard should be unhesitatingly condemned.

The question of the publication of the results of laboratory analysis has risen a number of times in the last two years. The results of chemical analysis and the determination of the addition of water are so clear and definite that it is perfectly proper that they should be published at any time when it is so desired. The significance of a bacteriological analysis, however, is somewhat indefinite and uncertain, and the figures are apt to be misleading. It is a well known fact that a dairy which ordinarily produces milk with a low bacterial count, will occasionally, for unknown reasons, have a count running up very high. Moreover, it is recognized that the errors of laboratory analyses are such that the number of bacteria does not have the accurate meaning that it does in chemical work. For example, milk analyzing 10,000 per c.c. is probably no better than milk analyzing 15,000. Nevertheless, those who are unfamiliar with bacteriological methods would undoubtedly regard the former milk as decidedly superior to the latter, although no bacteriologist would think of making much difference between them. In such cases, the publication of individual analyses is very misleading and liable to do injustice. The position taken by the Commission of Milk Standards, is that no bacteriological analysis should be published unless it is the average of at least four successive analyses. Under these circumstances, they are reliable enough to have significance. This laboratory, therefore, whenever it has an opportunity, urges that individual bacteriological examinations should never be published, because they are so sure to be misleading. We urge, however, that where it is possible to do so, the general results of the examinations of milk should be made public in the locality from which the samples are obtained, but that special care be exercised not to publish bacteriological analyses from single examinations.

Conclusion.—The most valuable results of the last four years upon milk has been in the increased interest that is taken at the present time as to the quality of the product that is placed upon our markets. When our work began four years ago, the subject received no attention in any towns in the state with the exception of two or three of the largest cities. The rest of the state was without any protection and the public at large had no safeguard whatsoever placed around this most valuable food product, except by unenforced laws in the statutes. At the present time, most of the health officers in the state have become interested in the character of the milk furnished in their own town. The public in general has become somewhat educated as to the dangers that may be found in this best and cheapest, and at the same time, most dangerous of food products, and thus a public interest has been developed around the state as to the quality of the milk on sale. The interest developed all along this line is sufficient justification of the work undertaken in this direction, and leads to the conviction that it is one of the most valuable pieces of work that this laboratory has hitherto undertaken in the protection of the public health.

H. W. CONN, *Director.*

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REPORT ON THE INVESTIGATION OF RIVER POLLUTION AND WATER SUPPLIES

By James A. Newlands, Chemist.

This report covers the work of the Chemical Laboratory of the State Board of Health from October 1, 1910, to September 30, 1912.

The investigation of water supplies and sewage disposal has, as heretofore, been done under the supervision of a committee of the State Board of Health, consisting of Dr. E. K. Root, Dr. J. H. Townsend and Mr. T. H. McKenzie.

The work of the laboratory has continued in charge of the writer with Mr. A. L. Gammage as assistant until February, 1911, when he resigned to accept another position. Mr. Thomas R. Lathrope carried on the work until May, 1912, when he resigned to accept another position and was succeeded by Mr. F. Lee Mickle, who was transferred from the bacteriological department.

EXAMINATION OF WATER AND SEWAGE.

The examinations of water samples sent to the laboratory by local health officials in accordance with Section 2596 of the General Statutes have been continued, and monthly examinations of water from twenty municipal supplies have been made during all or a portion of the past two years. Samples of sewage and sewage works effluents from five disposal plants have also been examined at regular intervals. A total of 1,019 samples of water, sewage and sewage works effluents have been examined during the period covered by this report, representing an increase of about 10% over the work of the previous two years.

TESTS OF ILLUMINATING OIL.

One hundred and five samples of illuminating oil have been examined for flash and fire tests in accordance with the law enacted by the legislature during 1908. The tests have in every case given results within the requirements of the law, but they represent only oils sampled in Middletown and vicinity as there is no provision, at present, for the collection of samples from other parts of the state.

TYPHOID FEVER EPIDEMIC AT TORRINGTON.

During an outbreak of typhoid fever at Torrington, in September, 1911, which resulted in 329 reported cases and thirty-five deaths, the State Board of Health was asked to assist the local health authorities in tracing the cause of the disease, and the writer, at the request of the board, made an investigation, the results of which are embodied in the following report:

The Connecticut State Board of Health, Hartford, Conn.:

GENTLEMEN:—I have the honor to submit the following report on my investigation of the typhoid fever epidemic at Torrington, Connecticut, which began in September, 1911.

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In the collection of data embodied in this report I am under obligations to the borough officials, the local physicians, the water company, and the local relief committee for their hearty co-operation. I am especially indebted to Dr. George Streit, health officer; Mr. C. E. Patterson, borough engineer; Mr. George C. Ham, state sanitary inspector; and to Mr. John N. Brooks, of the water company, for personal services on lines of investigation which would have been difficult or impossible to complete without such assistance.

HISTORICAL.

As shown by Table No. 1 the cases began to appear during the first week in September, but the seriousness of the epidemic was not realized until about the middle of the month, when more than fifty cases were reported to the health officer within a few days. The epidemic developed 329 reported cases and 35 deaths. The borough has a population of 15,483 (Census 1910), is well sewered, and has had a public water supply since 1878, which now serves, approximately, 15,000 inhabitants.

TABLE No. 1.

DATES OF EARLIEST SYMPTOMS.

Day of Month	Cases.				Day of Month	Cases.			
	Sept.	Oct.	Nov.	Dec.		Sept.	Oct.	Nov.	Dec.
1	2	5	..	2	17	8	2	..	..
2	1	..	..	..	18	18	2	..	..
3	1	..	..	..	19	9	1	1	1
4	2	1	1	..	20	12	2	..	..
5	3	1	..	..	21	6	..	..	..
6	6	1	..	..	22	6	..	..	..
7	2	2	..	..	23	1	..	..	..
8	9	1	1	1	24	4	1	..	..
9	25	2	..	..	25	4	1	..	..
10	40	1	1	..	26	2	1	..	..
11	27	..	..	..	27	2	..	..	..
12	27	2	..	..	28	2	..	..	..
13	11	2	..	..	29	4	..	..	..
14	17	1	..	..	30	4	..	..	..
15	14	2	..	..		—	—	—	—
16	12	2	1	..	19	281*	33	5	5

*Dates of earliest symptoms for five other cases reported during September were not obtained.

Typhoid fever had not been epidemic in Torrington previous to this time and the records of this board show a typhoid death rate for the borough during thirty-one years from 1880, through 1910, of 2.19 per 10,000 population, while the rate for the state during the same period was 2.97. Table No. 2 shows the typhoid cases reported from Torrington during the past five years:

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TABLE No. 2.

REPORTED CASES OF TYPHOID FEVER.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ttl.
1907	..	..	..	..	..	..	3	2	2	1	2	..	10
1908	..	..	..	..	..	..	..	..	2	1	2	..	5
1909	1	..	..	..	..	..	..	..	4	..	1	1	7
1910	..	..	..	..	..	..	..	3	..	1	..	..	4
1911	..	..	..	..	1	..	..	3*	286	33	5	5	333

*Two cases reported in August gave dates of earliest symptoms in June and July.

One of the first theories for the sudden onset in September, according to statements in the local papers, was that contaminated fruit had been eaten. It soon became evident, however, that the cases were becoming too numerous to be accounted for in this way. Milk was considered a possible source, but on learning about this time that Marshall Lake, one of the reservoirs of the local water company, had been put into service on August 17, after having been out of commission for about two years, public sentiment turned against the water supply.

On September 16, a sample of water from Marshall Lake was brought to the Laboratory of the State Board of Health, warnings against the use of uncooked food, milk and water were issued in the local paper, a special meeting of the borough officials was called to consider plans for checking the epidemic, and Dr. J. H. Townsend, Secretary of the State Board of Health, was asked to co-operate with the local officials.

On September 17, as a result of the public criticism, Marshall Lake was shut off, the mains were thoroughly flushed, and the Crystal Lake System, which had been supplying only a portion of the borough, was made to serve the entire borough. On the same day Dr. Townsend, after a preliminary investigation with the local officials, directed the writer to go to Torrington to examine the watersheds supplying the borough and to make any further investigations which might be of assistance in locating the cause of the epidemic. The investigation of the watersheds was begun on September 18 and at the same time information regarding the distribution system was obtained from officials of the water company. The results may be stated as follows:

STUDY OF WATERSHEDS AND DISTRIBUTION SYSTEM.

The water supply is obtained from two sources which, for convenience, I will designate as the Crystal Lake and the Hart Brook systems. These are outlined on the accompanying map, No. 1. The distributing reservoir, Crystal Lake, with storage from Hatchalusie Lake and Whist Pond, and the run-off from a small area southwest of the distributing reservoir, supplies, ordinarily, the portion of the borough marked Section A on map No. 2. Hart Brook Pond, with storage from North Pond and Marshall Lake connected with the main a short distance south of Hart Brook Pond, serves Section B, while Section C receives mixed water, the two systems being connected throughout this portion of the borough. The section lines, which are of considerable importance in the study of the epidemic, were laid out as carefully as possible with the data then available, and the work was checked up by Mr. John N. Brooks and Mr. W. E. French of the water company. In addition to the connections between the two systems within the borough limits in Section C, the writer was informed that the mains of the systems are connected at the West Torrington crossroads

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southeast of Crystal Lake, and are so arranged that either system may be used to serve the entire borough. With both systems in use and the connecting valve open, water from the Hart Brook system is sometimes forced back into Crystal Lake, as the Hart Brook Pond water level is about one hundred feet higher than that of Crystal Lake. Because of this difference in pressure, water from Crystal Lake cannot reach the Hart Brook distributing system with the ordinary draft on the supply. This fact is of interest in our study of the epidemic.

The inspection of the drainage areas showed a total of fifty houses with a population of 210. While unsatisfactory conditions were found at some of these places, notably houses numbered 8, 10, 11, 12, 18 and 41 where outbuildings are too close to the stream, none of these, apparently, had any connection with the epidemic, as there was no history of typhoid fever having occurred in past years and there were no cases among the people then resident on the watersheds. On the drainage area of Marshall Lake, which was at first suspected, nothing was found which could be considered as endangering the supply, the nearest building, a barn on the road west of the lake, being about a thousand feet distant. The land bordering the lake, however, is used as a pasture, an objectionable feature which can, and should be eliminated.

On the Crystal Lake catchment area less satisfactory conditions were found. The proximity of the main stream and some of its tributaries to frequently traveled roads makes intermittent contamination of the streams by road wash inevitable. The most noticeable feature on this system, however, is an intake on the main stream at the head of Crystal Lake, as indicated on Map No. 1. This intake, built in 1893, diverts water from the stream directly into the mains and is used, ordinarily, in warm weather to avoid the objectionable tastes and odors produced by fresh water algae growths in Crystal Lake. Realizing the possibilities for infection from this source the matter was immediately brought to the attention of the borough warden, Mr. Wm. H. Dayton, who arranged for a meeting with some of the officers and directors of the water company on the evening of September 20. At this meeting the danger of using for drinking purposes a running stream from an inhabited drainage area where accidental infection of the stream would be quickly carried into the mains was explained, and in view of the fact that the borough at this time was supplied from the stream intake because of public sentiment against the Marshall Lake supply, the officials were advised to disinfect all water supplied from this source, as a precaution, until the cause of the epidemic could be definitely located. While there was no evidence at this time to show that the Crystal Lake supply was in any way responsible for the epidemic, the matter was taken up immediately by the company and within four days a plant for the treatment of the water with calcium hypochlorite was installed and put in operation. The evidence since accumulated indicates that this was an important step.

LABORATORY INVESTIGATIONS.

The fact that the epidemic was not noticed until it had gained considerable headway delayed the beginning of laboratory examinations of the water until September 15, but analyses of samples from Marshall Lake, Crystal Lake, and from taps throughout the borough showed that both systems had received a noticeable amount of contamination previous to that date. The numbers of bacteria were not excessive in all cases but the persistent appearance of colon bacilli in small amounts of the water indicated that something unusual had occurred. The Marshall Lake sample showed 480 bacteria per cubic centimeter and the sample from Crystal Lake 430. In both cases colon bacilli were present in one cubic centimeter volumes of the water. On September 19 tap samples collected

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from six houses in different parts of the borough showed numbers of bacteria varying from 125 to 1025 per cubic centimeter with an average of 490. Colon bacilli were found in five out of six samples in from one to five cubic centimeter volumes of the water. A sample taken from Hart Brook Pond on September 25 did not show colon bacilli. On September 29, five days after the disinfection plant had been put in operation, seven tap samples showed numbers of bacteria varying from 50 to 890 per cubic centimeter. Colon bacilli were absent in five cubic centimeter volumes in four of the seven samples and it is of interest to note that the samples showing the colon bacillus and a high bacterial count were all off the main lines near the ends of Hoffman Street, Main Street and Washington Avenue, indicating that the untreated water had not been entirely flushed out at these points. Eight samples collected on October 8 showed numbers of bacteria ranging from 15 to 105 per cubic centimeter with an averge of 50 and colon bacilli were absent in every case in five cubic centimeter volumes of the water. The colon bacillus was not found in the tap water again until May 22, 1912, following heavy rains, when it was isolated from three tap samples out of four, in five cubic centimeter volumes of the water. The numbers of bacteria given above are taken from gelatin plates grown at 20 degrees C. and tests for the colon bacillus were made in accordance with the Standard Methods of the American Public Health Association. Tests for the typhoid organism were made by plating on Hesse agar from enrichment cultures in lactose bile.

While evidence of the presence of drainage contamination was definite in both systems at this time, efforts to isolate the typhoid organism from the water were unsuccessful. Negative results under such conditions, however, have no special significance. The isolation of the typhoid germ from water presents difficulties even when the infection is recent and a study of the meteorological data indicated that the first rains which had contributed to the contamination evident at this time fell about three weeks prior to the collection of the first water samples. This unavoidable delay and the fact that the mains had been carefully flushed in order to eliminate possible infection, greatly reduced the probability of our finding the organism, assuming that it had been carried into the mains by the rainfall referred to in the following paragraph:

RAINFALL STATISTICS.

A study of the local rainfall statistics for August and September made possible through the courtesy of Prof. H. G. Shaw of the Torrington High School, shows very clearly the cause of the contamination indicated in the bacteriological tests. The record for the first fifteen days of August shows a total precipitation of only two-hundredths of an inch. On August 16 and 18 there were .46 and .86 inches, respectively, with no further rainfall until the 25th. Between August 25 and September 1 rain fell every day, the total precipitation for this period being 4.45 inches, with a maximum fall of 1.20 inches on August 29. For September 6, 9, and 10 the records show rainfall of 1.15, 1.88, and .70 inches respectively. It was evident that the continued rain throughout the last week in August and the heavy rains of September 6, 9 and 10 must have scoured the drainage areas very thoroughly, and in the absence of adequate storage capacity in the distributing reservoirs evidence of contamination in the mains was to be expected.

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TABLE No. 3.

RAINFALL STATISTICS, 1911.

Day of Month	1911		Day of Month	1911	
	August	September		August	September
1	.01	.46	18	.68	..
2	..	..	19	..	..
3	..	..	20	..	..
4	..	..	21	..	..
5	.01	..	22	..	.43
6	..	1.15	23	..	Trace
7	..	Trace	24	..	Trace
8	..	..	25	.20	Trace
9	..	1.88	26	.76	.20
10	..	.70	27	.44	..
11	Trace	..	28	.34	.13
12	..	.19	29	1.20	.05
13	..	..	30	.33	.52
14	..	..	31	.72	..
15	..	..			
16	.46	.22	Totals,	5.15	5.93
17	..	..			

CASE STATISTICS.

Following the inspection of the drainage areas, a systematic study of the distribution of cases, and the collection of data regarding each case were taken up. Reports of cases sent to the health officer were arranged according to streets and each house was visited in order to get the statistical data, if possible, from the patient or a member of the family. In a number of instances where the patient had been taken to a hospital in another city, or for other reasons, full information was not available at the home of the patient, answers to some questions were obtained from the attending physician or through the borough clerk who was in communication with patients receiving aid from the borough. In about three hundred cases the date of earliest symptoms was obtained either from the patient or a member of the family. In the other cases the date of earliest symptoms was estimated with the assistance of the attending physician.

STUDY OF EVIDENCE.

Experience has shown that the carrier of infection in any large outbreak of typhoid fever is to be sought in some common article of food or drink. The evidence is necessarily indirect in most epidemics, as the infected food or drink is either entirely used in the interim between the date of infection and the appearance of the first symptoms of the disease, or the typhoid germs are so reduced in numbers as to make a practical demonstration of their presence improbable with laboratory methods now available. Proof of the cause of a sudden epidemic, then, must be based largely on circumstantial evidence obtained from a study of such possible carriers as fresh vegetables, shell fish, ice cream, milk, water and flies. The tabulated statistics of this study may be summarized as follows;

FRESH VEGETABLES.

It was not to be expected that fresh vegetables would be obtained from any one source by so many families as were affected by the epidemic, and

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a study of Table No. 4 shows that fresh vegetables could not have been the carrier of infection. It is of interest to note the large number of cases where private gardens were used. The table also shows that fresh vegetables were obtained from considerably over one hundred distinct sources.

ICE CREAM.

Table No. 5 shows that one hundred and twenty-four of the two hundred and two patients questioned had not used ice cream during the month previous to their illness.

TABLE No. 4.
FRESH VEGETABLES.

Source.	Patients.
No. 1	8
No. 2	1
No. 3	1
No. 4	1
No. 5	1
No. 6	1
No. 7	1
No. 8	2
No. 9	1
No. 10	3
No. 11	6
Various sources	79
Private gardens	97
Total	202

TABLE No. 5.
ICE CREAM.

Source.	Patients.
No. 1	18
No. 2	5
No. 3	5
No. 4	5
No. 5	7
No. 6	6
No. 7	1
No. 8	1
No. 9	3
Various sources	27
None used	124
Total	202

SHELL FISH.

Similar replies were received in answer to questions regarding the use of shell fish. Two hundred and two patients questioned had not eaten shell fish during the month previous to the onset of the disease, as shown by Table No. 6.

FLY INFECTION.

That fly infection could have had any important bearing on the spread of the disease during the early stages of the epidemic was not considered probable, but in order to study the possibility of secondary infection in this way methods of waste disposal were investigated. Table No. 7 shows that the majority of the cases were served by the sewerage system. In forty-two cases privies or cesspools were in use and in order to reduce the possibility of fly infection from these sources they were carefully disinfected at intervals under the direction of the local health officer.

TABLE No. 6.
SHELL FISH.

Kind	Patients
Clams	1
Oysters	2
None eaten	202
Total	205

TABLE No. 7.
WASTE DISPOSAL.

Method	Patients
Cesspool	8
Privy	34
Sewer connection	186
Total	228

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MILK SUPPLY.

The statistics recorded in Table No. 8 show that 143 patients used milk from three large dealers. A study of the sources from which these dealers obtained their milk, made possible through the courtesy of Dr. G. W. Loveland, borough milk inspector, showed that no two of the three dealers were receiving milk from a common source. In thirteen cases milk was obtained from cows owned by the family or a neighbor. In 43 other cases milk was bought from 13 distinct sources. The milk supply then was obtained from thirty or more distinct sources.

TABLE No. 8.

MILK SUPPLIES.

Source	Patients
Supply No. 1	52
Supply No. 2	51
Supply No. 3	40
Supply No. 4	9
Supply No. 5	7
Supply No. 6	6
Supply No. 7	4
Supply No. 8	4
Supply No. 9	3
Supply No. 10	3
Supply No. 11	2
Supply No. 12	1
Supply No. 13	1
Supply No. 14	1
Supply No. 15	1
Supply No. 16	1
Own or neighbor's cow	13
Condensed milk used entirely	3
Total	202

WATER SUPPLY.

As has previously been stated, a study of the distribution system of the water supply revealed the fact that Section A and Section B, as shown on Map No. 2, were served by the Crystal Lake and the Hart Brook systems respectively, while Section C received a mixture from the two systems. When the cases were located on this map a number of important facts were brought to light. As recorded in Table No. 9, 152 cases occurred on Section A and 153 on Section C, while Section B served by the Hart Brook system, had only 22 cases. A study of the cases revealed the fact that seven of the 22 cases on Section B had been employed in factories located on Section A, six others gave a definite history of having drunk water while in Section A and three others were undoubtedly secondary cases, leaving only six cases in which the history is indefinite. It is true that between September 17 and 24 the entire borough was supplied with untreated water from the Crystal Lake system and two of the six cases referred to gave dates of onset which would coincide with in-

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fection during that period but the other four cases gave dates of onset too early to be accounted for in this way.

In order to determine whether the cases had been distributed in proportion to the population of the sections the populations were estimated on the basis of the school census, this information being supplied by the borough and town clerks. The results show that Section A was estimated at 5,600, Section B at 5,510, and Section C at 5,650. With an even distribution of cases Section B would have contributed about 108 cases instead of 22.

TABLE No. 9.

WATER SUPPLIES.

Source	Patients
Crystal Lake System	152*
Hart Brook System	22
Water from both systems mixed	153
Total	327

*Two patients on the Crystal Lake system used well water at home but Crystal Lake water at their places of business.

GENERAL CONCLUSIONS.

It is evident from a study of the foregoing statistics that fresh vegetables, shell fish, ice cream, milk and flies, had no important connection with this epidemic. It is also apparent that the Hart Brook water system, including Marshal Lake, which had been generally suspected, could have had no connection with the spread of the disease, as the portion of the borough supplied from this source contributed only 22 cases out of a total of 327 and 16 of the 22 cases may be accounted for as previously explained. On the other hand, all the available evidence points strongly to the Crystal Lake system as the source of the infection. The main stream and some of the tributaries on the Crystal Lake system undoubtedly receive considerable amounts of road wash after rains, and as the roads are within easy walking distance of the borough and are used by pleasure seekers, more dangerous contamination is manifestly a possibility. When the stream intake is in use as it was at the time of the epidemic contamination is carried directly into the mains, as the small diversion dam on the stream gives no appreciable period for storage or sedimentation. Under these conditions the following facts are significant.

If we deduct 32 cases, which were evidently secondary infections, we find that all but six of the 295 primary cases investigated gave a history of having used water from the Crystal Lake system, or this mixed with Hart Brook water, during the month previous to the onset of the disease. The distribution of cases as shown on Map No. 2, locates 93.2% of the cases on sections where Crystal Lake water or this mixed with the Hart Brook water was used and it is significant that while no cases appeared in the fourteen houses connected to the Hart Brook system between Hart Brook Pond and the West Torrington cross roads, the first house in West Torrington connected to the Crystal Lake system contributed a case. Laboratory investigations showed that the water supply had been contaminated and the rainfall statistics not only confirm the laboratory tests but a comparison of Table No. 1 with Table No. 3 gives some important data on the relation of the rainfall to the onset of the epidemic. This relation is shown in the following table:

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TABLE NO. 10.

RELATION BETWEEN RAINFALL AND DATES OF ONSET.

Rainfall. Aug.	Dates of Onset. Inches	Cases	Sept	Rainfall. Sept.	Dates of Onset. Inches	Cases	Sept.
16	.46	..	..	1	.46	11	13
17	..	..	..	2	..	17	14
18	.68	....	..	3	..	14	15
19	..	..	..	4	..	12	16
20	..	2*	1*	5	..	8	17
21	..	1	2	6	1.15	18	18
22	..	1	3	7	..	9	19
23	..	2	4	8	..	12	20
24	..	3	5	9	1.88	6	21
25	.20	6	6	10	.70	6	22
26	.76	2	7	11	..	1	23
27	.44	9	8	12	.19	4	24
28	.34	25	9	13	..	4	25
29	1.20	40	10	14	..	2	26
30	.33	27	11	15	..	2	27
31	.72	27	12	16	.22	2	28
				17	..	4	29
				18	..	4	30
				19	..	5	Oct. 1

*These dates and cases fall 13 days after the corresponding August and September dates for rainfall.

It is generally assumed that the average period of incubation for typhoid fever is two weeks, although the time has been shown to vary at least from 5 to 29 days. (Hill, Jour. Infect. Diseases. Vol. IX., page 438). The rainfall statistics have been arranged in the above table to correspond with the cases which appeared thirteen days later. It will be seen that 51.6% of the September cases occurred approximately two weeks after the rains of the last week in August and September 1, and the largest number of cases recorded for one day gave September 10 as the date of onset, thirteen days after the heaviest rain during August. The heavy rain of September 6 was followed on September 18 by an increase in the number of cases recorded, but the rains of September 9 and 10 showed no appreciable effect in the number of cases and it is quite possible that practically the last of the active infective material was carried into the supply with the rain of September 6. The first infection of the supply could have occurred on August 16 or 18 although the data at hand would seem to indicate that it occurred during the last week in August as it is very probable that cases would have begun to appear before September 1 if the infection had been carried into the supply on the 16th or 18th.

Table No. 11 shows the sex and age distribution of cases and although the number of cases between five and ten years of age is a little higher than usual for water borne infections the proportions of the total cases between the ages of 0-5 and 0-15 do not approach the percentages which would be expected in a milk borne epidemic as indicated by Table No. 12.

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TABLE NO. 11.

SEX AND AGE OF PATIENTS.

Age	Male.	Female.	Total.	Age	Male.	Female.	Total.
0- 1	2	..	2	35-29	9	6	15
1- 4	11	7	18	40-44	6	9	15
5- 9	32	25	57	45-49	9	4	13
10-14	19	27	46	50 54	6	1	7
15-19	21	17	38	55-59	1	0	1
20-24	28	19	47	60-65	1	1	2
25-29	24	14	38		—	—	—
30-34	14	14	28	Totals,	183	144	327

TABLE NO. 12.

PERCENTAGE OF TOTAL CASES BETWEEN GIVEN AGES.

Place	Date	Caused by	Age 0-5 yrs.	Age 0-15 yrs.
Stamford*	1895	Milk	16.9%	48.19%
New Haven*	1901	Water	8.1%	36.73%
Torrington	1911	Water	6.1%	37.61%

*Report Connecticut State Board of Health, 1901, Page 300.

Briefly then the study of this epidemic shows that evidence to connect fresh vegetables, shell fish, ice cream, milk, flies, or the Hart Brook water system with the spread of the disease is wholly lacking. On the other hand possible sources of contamination on the Crystal Lake catchment area are not only evident but laboratory examinations of the water showed that general contamination of the supply had occurred previous to the onset of the epidemic. The rainfall statistics show ample cause for the contamination during this period and also show a time relation between the rainfall and the appearance of cases in the borough. Lastly, 93.2% of the cases were located in sections of the borough supplied wholly or in part from the Crystal Lake system, while an additional 4% of the primary cases from the section supplied by the Hart Brook system gave a definite history of having used Crystal Lake water at their places of business or while visiting in parts of the borough supplied from the Crystal Lake system.

All efforts to locate the original cause of the infection have been without result. None of the patients in Torrington who suffered from typhoid fever during the four months previous to the epidemic had been on the drainage area so far as could be learned, and rumors that two typhoid convalescents from other places had been on the watersheds, at times which would allow for infection of the supply and the proper period for incubation, could not be proven. The proximity of the Crystal Lake supply to the borough and the frequent use of the roads about the stream intake provide numerous possibilities for infection which would be very difficult to trace, and at the present time there appears to be little likelihood that the original case will be located.

The terrible results of this epidemic are simply a repetition of what has happened in numerous other cities in the past where surface supplies have

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been used without efficient storage, filtration, disinfection or combinations of such measures necessary to guard against the possibility that water accidentally infected with disease germs may sometime be carried to the city mains, and the fact that many supplies of this type have been used for years without apparent ill effects is manifestly due to good fortune rather than good judgment.

RECOMMENDATIONS.

I would recommend that permanent methods for safeguarding the supply, which will be acceptable to this board, be installed with all reasonable dispatch, and that in the meantime the temporary disinfection plant be continued in operation under competent supervision.

Respectfully submitted,

JAMES A. NEWLANDS,
Chemist State Board of Health.

THE INSPECTION OF PUBLIC WATER SUPPLIES.

During the past two years twelve public water supplies have been inspected and the general features of the reports on these are published herewith. One characteristic common to a number of the smaller supplies is worthy of brief mention. The small storage capacity given to distributing reservoirs with considerable drainage areas is practically equivalent, especially during wet weather, to the use of a running stream, and makes it possible for accidental infection of tributary streams to reach the water mains before the dangerous element of the contamination can be eliminated. The evidence obtained from the investigation of the typhoid fever epidemic at Torrington during the past year indicates very clearly that lack of storage had an important bearing on the spread of the disease, and while the accidental infection of a stream by typhoid bacillus carriers or by wastes from typhoid patients may occur only at infrequent intervals, the experiences of Torrington and other cities prove not only that the danger is a real one but impressively illustrate the disastrous results of such infection. The most effective and economical method for guarding against this danger can be determined only by careful study of the local conditions in each case, but the installation of such protective measures will represent insurance well worth the cost involved.

ANSONIA WATER COMPANY.

The Ansonia Water Company supplies that portion of the city of Ansonia which lies east of the Naugatuck River. The works of the company were begun in 1867 and there are now four reservoirs in use, all of which are on what is known as Beaver Brook. The company also owns a small supply known as the Parker Reservoir, located about one mile southeast of the city. This supply, however, has not been used. It has a drainage area of about .1 of a square mile, a water surface of 15.5 acres, and a capacity of fifteen million gallons.

PEAT SWAMP RESERVOIR.

Peat Swamp Reservoir, built in 1895, is the main storage supply for the high pressure service. The reservoir covers an area of 42.5 acres with a capacity of one hundred and eighty million gallons and has a drainage area of about 330 acres. There are three houses on the watershed with a population of sixteen, equivalent to 31 per square mile.

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FILTRATION RESERVOIR.

Filtration Reservoir, located about one and three-fourths miles northeast of the city, was built in 1886, but has been abndoned since 1904.

MIDDLE RESERVOIR.

Middle Reservoir, built in 1867, is now the distributing supply for the high pressure service. The reservoir has a water surface of 2.8 acres with a capcaity of 20 million gallons. Three streams to the southeast, as shown on the map, are diverted to this reservoir, giving a total drainare area of about 1.1 square miles, exclusive of the area tributary to the Peat Swamp storage supply. There are two houses on the diverted area southeast of Middle Reservoir with four people, or about four per square mile.

QUILLINAN RESERVOIR.

This supply, built in 1883, and used as the low pressure distributing reservoir, is located about three-fourths of a mile northeast of the city. The water surface covers twelve acres with a capacity of 33 million gallons and there is a drainage area of about one square mile. There are thirteen houses on the watershed with a population of 53, equivalent to 53 per square mile.

The company now controls a considerable portion of the land adjoining the reservoirs and tributary streams. The following is an account of the conditions found at the houses on the drainage area. The houses are numbered to correspond to numbers locating them on the accompanying map.

No. 1. M. H. place. Eight in family. Four cows on the premises. Barn about 175 feet from the reservoir.

No. 2. M. M. McC. place. Eight in family. One horse and two cows on the premises. Toilet drains to a cesspool about one hundred feet from reservoir.

No. 3. J. F. and L. place. Seven people in the house. No stock. Ground privy Sink drains on the ground. Not near.

While houses 1, 2 and 3 are on the natural drainage area tributary to Quillinan Reservoir, the drainge from these places has been diverted by means of a ditch along the west side of the road to a catch basin, as indicated on the map, from which point it is carried through a drain pipe to a point below the reservoir.

No. 4. L. J. place. Two in the family. No stock. Ground privy. Brook about 300 feet distant with a road between.

No. 5. Mr. L. place. Three in family. No stock. Ground privy. About 600 feet from brook, with roadway between.

No 6. W. place. Five in family. No stock. Ground privy. About five hundred feet to brook.

No. 7. W. tenement. Ten in the house. Ground privy. About 700 feet to brook.

No. 8. D. S. place. Eight in family. No stock. Ground privy. Brook about 700 feet distant.

No. 9. T. S. place. Four in house. One cow on premises. Ground privy. Brook not near.

No. 10. House oposite No. 11. Name not learned. A spring just in front of the house forms a small brook which disappears in the meadow land west of house No. 5. No visible stream from meadow to reservoir.

No. 11. S. property. Four in the house. No stock. Ground privy. No brook near.

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No. 12. C. E. place. Four in house. No stock. Ground privy. No brook near.

No. 13. J. M. place. Four in house. No stock. Ground privy. No brook near.

No. 14. E. Q. place. Four in the house. No stock. Ground privy. Brook about 400 feet distant.

No. 15. H. place. Three in the house. No stock. Ground privy. About 400 feet to brook.

No. 16. House owned by Water Company. Three in the house. Ground privy. About 500 feet to the brook.

No. 17. A. B. place. Four in the house. Three horses, twenty-four cows and seven pigs on the premises. Ground privy. About 600 feet to brook.

No. 18. Empty house. Ground privy. About 300 feet to brook.

No. 19. W. place. Six in the house. Three horses and one cow kept on the premises. Sink drains to a small cesspool. About 400 feet to the brook. Place now owned by the Water Company.

No. 20. H. S. place. Six in the house. One horse kept on premises. Privy has a vault. About 300 feet to the brook.

No. 21. P. S. place. Four in the house. No stock. Privy has a vault, and is about 150 feet from the brook. Place owned by the Water Company.

SUMMARY.

Drainage area for entire system	2.6 square miles
Total houses on drainage area	18
Total number of people	74
Total number of animals on area	40
People per square mile	28
Animals per square mile	15

GENERAL CONCLUSIONS.

A number of houses formerly located close to the reservoirs and tributary streams have been removed by the water company and in the foregoing list all of the places appear to be far enough away to avoid surface wash to the supply under existing conditions. It would be advisable, however, to keep the ditch east of houses 1, 2 and 3 cleaned in order to avoid the possibility of wash being carried across the road during heavy rains.

The watershed, as a whole, is clean, and there appears to be little chance for serious contamintion of the supply under ordinary conditions. Where storage is depended upon for the elimination of accidental contamination, however, it should be understood that small reservoirs may prove inadequate under unusual conditions, such as low water stages followed by heavy rains, and accidental typhoid infection of the water under such conditions, would be carried quickly through the reservoir to the city mains. While such a combination of circumstances may not occur in a great many years, past experience in other places has shown that it must be recognized as a possibility and that it is a factor which should be given consideration in the future development of the supply.

THE FOUNTAIN WATER COMPANY.

ANSONIA, CONN.

The first works of the Fountain Water Company, which supplies a portion of Ansonia west of the Naugatuck River, were built in 1872.

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The supply is obtained from Fountain Lake, an artificial reservoir located about a mile and a half northeast of the city. The reservoir has a water surface of about six acres, a capacity of thirty million gallons and drains an area of about one square mile. The run-off from another drainage area located about two and a half miles northeast of the city, is also diverted and flows by gravity through a four and a six-inch main to Fountain Lake. There are no houses on the drainage area directly tributary to Fountain Lake, and only four houses on the area above the diversion dam.

About five thousand people are served by the company and the daily consumption not known. An additional supply will probably be necessary in the near future but no definite plans for this have been worked out. The company has about thirteen miles of four to twelve inch mains.

The houses on the watershed have been visited and the following is an account of the sanitary conditions existing at each house. The houses are numbered to correspond to numbers locating them on the accompanying map.

No. 1. Mrs. A. M. place. Five in family. Two horses, fifteen cows and three pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 2. Mr. J. B. place. Seven in family. One horse, eleven cows and six pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 3. J. D. place. Eight in family. One horse, eight cows and two pigs on the premises. Ground privy. Sink drains on the ground. Privy 175 feet from a swamp. Barn 150 feet from swamp. Health of family good. Manure pile about 150 feet from swampy land.

No. 4. Mrs. J. B. place. Three in family. Four horses, six cows and two pigs on the premises. Vault under privy. Sink drains on the ground. Health of family good. About 300 feet to a swamp and a small brook.

GENERAL CONCLUSIONS.

None of the houses or outbuildings in the above list are close enough to the streams to make them dangerous or objectionable and, under ordinary conditions, there is little danger of serious contamination of the supply. Like a number of our Connecticut supplies, however, the capacity of the reservoir is small and attention should be called to the fact that while storage is an accepted and a common method of water purification, a false feeling of security is assumed, if under such conditions as low water stages followed by heavy rains, the storage period is too short to eliminate accidental infection of the water before it reaches the city mains. This fact should be given consideration in the future improvement of the supply.

MANCHESTER WATER SUPPLY.

The works are owned by the Manchester Water Company and were begun in 1889. There are now two reservoirs known as the Distributing Reservoir and the Risley Reservoir.

RISLEY RESERVOIR.

The Risley Reservoir is located about two and a half miles east of the borough and is used as a storage supply. It has a water surface of ten acres with a capacity of forty million gallons and an average depth of about twelve feet.

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DISTRIBUTING RESERVOIR.

The Distributing Reservoir is located about two miles east of the borough. It covers one and a half acres with a capacity of three million gallons and an average depth of six feet. This reservoir is fed mainly by Wilson Brook, and Risley Reservoir has not been used up to the present time excepting to supply some of the mills for manufacturing purposes.

About forty-five hundred people are served by the company. The daily consumption is not known. The company has twelve miles of four to sixteen inch mains. Galvanized iron service pipe is used. The drainage area has been inspected and the following is a detailed account of the conditions found at each house. The houses have been numbered to correspond to numbers locating them on the accompanying map.

INSPECTION OF WATERSHED.

No. 1. F. S. P. place. Four in family. Three horses, eight cows and three pigs on the premses. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 2. W. S. B. place. One in the house. Two horses, three cows and three pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. About 600 or 700 feet to the reservoir. Fairly level ground. Has an extensive chicken farm here.

No. 3. G. W. and E. E. place. Three in the house. No stock. Ground privy. Sink drains on the ground. Health of family good. About 300 feet to reservoir. Privy drains toward the other watershed.

No. 4. J. S. R. place. Five in family. Four horses, twenty-four cows and four pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. Brook not near.

No. 5. Mr. C. L. A. place. Four in family. One horse, three cows and two pigs on the premise. Health of family good. Ground privy. Sink drains on the ground. Several hundred feet to brook.

No. 6. C. P. place. Three in family. One horse, two cows and two pigs on the premises Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 7. J. F. place. Two in family. One horse and three cows on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 8. F. W. B. place. Four in family. Three horses, twelve cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. Marshy land and two springs about 75 feet from the barn.

No. 9. W. H. S. place. Two in family. Two horses and two cows on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 10. W. F. B. place. Four in family. Three horses, nine cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 11. W. L. F. place. Four in family. One horse, three cows and one pig on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 12. O. E. M. place. Three in family. Two horses, three cows and four pigs on the premises. Box privy. Sink drains on the ground. Health of family good. Small pond back of the house, about 70 feet from the barn, and 20 feet from the chicken coops. Conditions here not satisfactory.

No. 13. Mr. J. place. Two in family. One horse, three cows and

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nine pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 14. Mr. A. P. place. Three in family. Three horses and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 15. E. S. P. place. Three in family. One cow on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 16. Mr. W. B. M. place. Three in family. One horse and three pigs on the premises. Box privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 17. C. McK. place. Two in family. One pig on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 18. Mr. H. place. Four in family. Two horses on place. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 19. L. J. R. place. Two in family. One horse, two cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 20. A house under construction. Brook not near.

GENERAL CONCLUSIONS.

With the exception of the O. E. M. place, the houses and outbuildings on the drainage area do not apper to be close enough to the reservoir or tributary streams to seriously menace the supply. The small size of the distribting reservoir, however, is open to criticism. Under ordinary conditions there is storage capacity for less than one day's supply. Following heavy rains, any chance infection deposited along the shores of Wilson Brook by hunters or other persons on the watershed, would be carried almost directly into the mains, and while such infection might not occur in a great many years, past experience has shown, notably at Torrington during 1911, that such a combination of circumstances will have very serious results when it does occur. If storage is to be depended upon for protection against accidental contamination of the supply, the storage should be great enough to be effective under all conditions which may occur throughout the year.

NORWICH WATER SUPPLY.

The works are owned by the city and were begun in 1869. The sources of supply are as follows:

FAIRVIEW RESERVOIR.

This reservoir is located about one and a half miles northeast of the city. It is used as a storage and distributing supply. The area of the watershed is about three-fourths of a square mile. The reservoir covers approximately eighty acres and has a capacity of four hundred and fifty million gallons with an average depth of 19.7 feet. There is very little shallow flowage.

MEADOW BROOK RESERVOIR.

This supply, located about two miles northwest of the city, was acquired in 1881. The water is diverted, by means of a small dam, to Fairview Reservoir, through a 24-inch main, seventy-one hundred and sixty

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feet in length. The diversion pond covers about thirty acres and has a capacity of one hundred and twenty-five million gallons but there is not usually more than twenty-five to thirty million gallons of water in the pond as it has been drawn off rapidly in recent years. The area of the watershed above the diversion dam is about one and a half square miles. The watershed is hilly and mostly woodland with some pasture land.

TRADING COVE BROOK.

During 1910 the city suffered from water shortage and a temporary supply was obtained from Trading Cove Brook at a point about a mile and a half west of the city. The stream drains about nine square miles at the point of diversion. The supply was pumped to the city and was purified by means of mechanical filters.

STONY BROOK RESERVOIR.

Stony Brook Reservoir, located about four miles west of the city, is now under construction. It has a drainage area of 2.4 square miles. The watershed is hilly and mostly woodland and all houses are to be removed. The reservoir will have a water surface of seventy acres and a capacity of three hundred and eighty-eight million gallons with an average depth of 15.3 feet.

Note—The work at Stony Brook Reservoir was completed on Dec. 1, 1912, and the wash gate closed Dec. 4. At this date, Jan. 13, 1913, there are about 200 million gallons of water in storage.

About twenty thousand people are served by the supply and the daily consumption is estimated at about two million gallons, or about 100 gallons per capita. There are fifty-two miles of four to twenty-four inch mains in use. Lead service pipe is used for house connection.

The drainage areas of Fairview and Meadow Brook reservoirs have been inspected and the following is a detailed account of conditions found. The houses are numbered to correspond to numbers locating them on the accompanying map.

FAIRVIEW RESERVOIR WATERSHED.

No. 1. C. H. place. Two in family. No stock. Ground privy and sink drain. Health of family good. No brook nearby.

No. 2. A new house under construction. No brook nearby.

No. 3. C. W. G. place. Three in family. Three horses and three cows on premises. Ground privy and sink drain. Health of family good. No brook nearby.

No. 4. L. F. place. Four in family. Two horses and nine cows on premises. Ground privy and sink drain. Health of family good. No brook nearby.

MEADOW BROOK WATERSHED.

No. 1. W. H. place. Two in family. One horse and three cows on premises. Ground privy and sink drain. Health of family good. No brook nearby.

No. 2. E. B. place. Seven in family. One horse and two cows on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 3. C. L. place. Six in family. Two horses and eight cows on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

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No. 4. Mr. L. place. Five in family. Four horses, ten cows and five pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 5. S. B. place. Two in the family. One horse and three cows on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 6. C. B. place. Six in family. Three horses and fifteen cows on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 7. J. S. place. Four in family. Three horses and twenty-five cows on premises. No brook nearby. Barn only on the drainage area.

No. 8. C. H. place. Three in family. One horse and one cow on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

GENERAL CONCLUSIONS.

All of the houses and outbuildings in the foregoing list are on the ridges along the edge of the watershed, as shown on the map and are not close enough to tributary streams to endanger the supply. The present conditions appear to be satisfactory and the department officials are to be commended for protecting the public by the installation of filters for their temporary supply during the recent water shortage, as it too often happens that emergency supplies from questionable sources are used without the installation of protective measures.

THE SHELTON WATER COMPANY.

The Borough of Shelton is supplied by the Shelton Water Company, whose works were begun in 1879. The original reservoir has since been abandoned and the present supply consists of two reservoirs known as No. 1, built in 1901, and No. 2, built in 1881. They impound a small stream at points about three-fourths of a mile and a mile and a half respectively, west of the borough.

Reservoir No. 1, the distributing supply, has a drainage area of 519 acres, most of which is woodland and pasture. The reservoir has a surface area of ten acres with a capacity of twenty-two million gallons. There are three houses on the drainage area with a population of twelve or fifteen per square mile.

Reservoir No. 2 has a storage capacity of eighty-five million gallons and a surface area of twenty-one acres. There are two houses on the drainage area of 221 acres, with a population of nine, equivalent to twenty-six per square mile.

During 1910 the borough suffered from water shortage and the company now has an arrangement with the Birmingham Water Co. of Derby, whereby an additional supply can be obtained when necessary from the Four Mile Brook supply.

About forty-five hundred people are served by the Shelton Water Company and the daily consumption is estimated at eight hundred thousand gallons or about 175 gallons per capita.

INSPECTION OF DRAINAGE AREA.

The drainage area has been carefully inspected and the following is a detailed account of the conditions found at each house. The houses are numbered to correspond to numbers locating them on the accompanying map, (page 168).

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INSPECTION OF WATERSHED.

No. 1. Hay barn.

No. 2. P. C. place. Six in family. Two horses on the premises. Ground privy. Brook about 800 feet distant.

No. 3. Mr. S. place. Five in family. One horse on the premises. Ground privy. Brook about 1,000 feet away.

No. 4. G. D. place. Two in family. Only the barn is on the drainage area. No brook nearby.

No. 5. W. W. place. Four in family. Two horses, three cows and one pig on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 6. F. R. place. Five in family. No stock. Ground privy. Sink drains on the ground. Privy about 650 feet from brook. Barn 650 feet from brook. Slope of about ten per cent. Health of family good.

No. 7. W. L. place. One in the house. Two horses on the premises. Ground privy. Sink drains on the ground. No brook nearby.

SUMMARY.

Drainage area for the entire system	1.15 square miles
Total number of houses on the drainage area ..	6
Total number of people on the drainage area....	21
Total number of animals on the drainage area..	11
Average number of people per square mile....	18
Average number of animals per square mile....	9

GENERAL CONCLUSIONS.

As all of the houses and outbuildings now located on the drainage area are at a considerable distance from the reservoirs or their tributary streams, there appears to be little chance for direct contamination of the supply from any of these places.

The question of storage, however, should be given consideration if no other protective measure is to be adopted. The distributing reservoir has a capacity of only twenty-two million gallons which is equivalent to about twenty-seven days' supply when the reservoir is full. During the water shortage of the past year the storage period in the reservoir was greatly reduced and under such conditions accidentally infected water from the streams might easily pass through the reservoir to the mains before sedimentation, sunlight, and other purifying agencies have had time to eliminate the dangerous elements in the water. While such a combination of circumstances might not occur in a great many years, experience in other places has shown that it is a possibility which must be reckoned with, and the resultts are so serious as to be worthy of grave consideration in the future development of the supply.

The company has removed a number of buildings which were formerly near the brooks tributary to the reservoirs and they have adopted a policy of purchasing land on the drainage area whenever it can be bought. As a result of this policy the watershed is now comparatively clear and aside from the question of storage capacity referred to above the supply is in a very good condition.

SOUTHINGTON WATER SUPPLY.

The works were begun in 1884 by the Southington Water Company and were taken over by the Town of Southington in 1911. There are at present three reservoirs in use.

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OLD STORAGE RESERVOIR.

The Old Storage Reservoir, located about four miles northwest of the town, was built in 1884. It is used as a storage supply. It has a drainage area of about one and three-fourths square miles, most of which is woodland with perhaps one-fifth cultivated fields. The reservoir has a water surface of twenty-three acres, with a capacity of sixty million gallons and an average depth of about eight feet. There is only one house on this watershed with six people which is equivalent to about three per square mile.

DISTRIBUTING RESERVOIR.

This reservoir, built in 1884, has a surface area of one and a half acres and a capacity of three million gallons, with an average depth of about six feet. It receives water from the Old Storage Reservoir in addition to a small drainage area covering about three-fourths of a square mile. There are no houses on the drainage area directly tributary to this supply.

NEW STORAGE RESERVOIR.

This reservoir is located about three and three-fourths miles southwest of the town. It was built in 1910 and is used both as a storage and distributing supply. It has a watershed of approximately half a square mile, about 50 per cent. of which is woodland and the rest pasture and cultivated fields. The reservoir has an area of 16.5 acres with a capacity of 43 million gallons and an average depth of 8.0 feet. About 25 per cent. of the reservoir is shallow flowage, i. e., less than four feet deep. There is one house on the watershed with two people, equivalent to four per square mile.

About four thousand people are served by the system and the daily consumption is estimated at a little less than a million gallons. There are twenty-five miles of one to twelve-inch mains in use. Galvanized iron service pipe is used for house connections.

The watershed has been inspected and the folllowing is an account of the conditions found.

A. H. M. place. This place is located on the road just west of the New Storage Reservoir dam, but only the barn drains toward the supply as the house and outhouse drainage are carried below the dam and into another watershed. There are six horses and forty-six head of cattle kept on the premises and while it would be advisable to discontinue the use of the slope west of the reservoir for grazing purposes, the present condition is more objectionable than dangerous.

L. L. place. This house is on the road west of the Old Storage Reservoir and about half a mile northwest of the upper end of the supply. There are six people in the house and a horse is kept in a barn which is about 600 feet from the nearest stream. The privy is built over a ditch about three feet deep and it was evident that the wastes would be carried along in the ditch to the main stream during heavy rains or freshets.

E. H. place. On the second road west of the New Storage Reservoir. Two people living in the house. Three horses, four cows, and two pigs kept on the premises. The barn, privy, and pig-pen are all on the edge of a slope but there are no brooks nearby.

GENERAL CONCLUSIONS.

The only criticism to be made regarding conditions on the watershed is the location of the privy at the L. L. place, and this, it was said, would be immediately remedied.

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Attention should be called to the small size of the old distributing reservoir which, like a number of other small supplies in the state, does not give sufficient storage to eliminate accidental infection from hunters or others in case it should get into the tributary streams. The drainage area of three-fourths of a square mile is free from habitation, and it is true that specific germs of disease from hunters or others temporarily on the watershed may not infect the supply in a great many years, but experience in other places has shown that it is a possibility which should be considered in the future development of the supply, as infection of the water under such conditions will produce serious results.

SOUTH MANCHESTER WATER SUPPLY.

The first works supplying South Manchester were constructed in 1870 and were owned by the Cheney Brothers. The South Manchester Water Company now serving the borough, was chartered and organized in 1889. There are now three reservoirs in use.

TAYLOR RESERVOIR.

This reservoir, the original source of supply, is still owned by Cheney Brothers and is used mainly for manufacturing purposes, but a portion of the water is sold each year to the Water Company to supply the eastern part of the town. The reservoir is located about 1.5 miles east of the borough. It has a surface area of 3.4 acres, with a capacity of five million gallons and an average depth of 4.5 feet. The drainage area cover about .9 of a square mile, all of which is owned by Cheney Brothers. There are no houses on the watershed.

PORTER RESERVOIR.

Porter Reservoir, built in 1890, is about 1.75 miles nonrtheast of the borough. It has a surface area of 7.3 acres, with a capacity of thirty-two million gallons, and an average depth of about 13.4 feet. The sides are rip-rapped entirely around the pond. There is one house on this drainage area.

HOWARD RESERVOIR.

Howard Reservoir, located about two miles northeast of the borough, was built in 1904. This reservoir is the storage supply for Porter reservoir. The total drainage area for the two supplies is 1.4 square miles. Howard reservoir has a surface area of twenty-one acres and a capacity of 124 million gallons with an verage depth of about 18.1 feet. There are four houses on the watershed, with a total population of fourteen or about ten per square mile. The company serves a population of about nine thousand. A large portion of the drainage area is owned by the water company and the four houses on the Howard Reservoir watershed are all at a considerable distance from any running water. The following is an account of the conditions found at these houses. The houses are numbered to correspond to the numbers locating them on the accompanying map, (page 170).

No. 1. C. R. place. Three in family. One horse on the premises. Shallow vault under privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 2. W. E. H. place. Five in family. One horses and six cows on premises. Shallow vault under privy. Sink drains to a cesspool. Health of family good. No brook near.

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No. 3. C. S. place. Six in family. Twelve cows on the premises. Shallow vault under privy. Sink drains on the ground. No brook nearby.

No. 4. C. D. C. place. No brook near.

GENERAL CONCLUSIONS.

The four houses referred to above are all on the extreme eastern ridge of the drainage area as shown on the accompanying map and do not apper to endanger the supply under existing conditions.

Attention should be called to the slight danger which results from small storage capacity in the distributing reservoirs, especially with reference to the Taylor Reservoir. During low water stages it is quite possible that brook water accidentally contaminated by hunters or others while on the watershed might be carried through the reservoir to the mains before sedimentation, sunlight, temperature, and the other purifying agencies of nature had time to eliminate the dangerous elements in the water. This danger, however, has been materially reduced by the very great care taken by the company in safeguarding the drainage ares. The entire drainage area tributry to Taylor Reservoir is owned by the company and the houses on the other area, with the exception of the four previously referred to, have been bought and removed. A caretaker is employed on the watersheds of the Porter and Howard reservoirs, and the few roads crossing this area are little used. The area is also posted to prohibit hunting and fishing, and under ordinary conditions there appears to be little danger of serious contamination of the supply.

THE STAMFORD WATER SUPPLY.

The City of Stamford is supplied by the Stamford Water Company whose works were begun in 1871. The supply now consists of three reservoirs known as Trinity Lake, Mead Pond, and Stamford Reservoir.

TRINITY LAKE.

Trinity Lake was originally three small natural ponds fed by springs and a small drainage area. Following the purchase of this supply a dam was built raising the water level so as to form one lake, and again in 1895 the dam was raised to its present height. This lake is in New York state near Pound Ridge, and about twelve miles north of Stamford. It is used as a storage supply. flowing by gravity through a natural watercourse to the Stamford Reservoir. It has a watershed of about one square mile, practically all of which is owned by the water company. About eighty per cent. of the drainage area is woodland with about twenty per cent. pasture. The lake covers an area of 72.9 acres and has a capacity of 450 million gallons with an average depth of twelve feet.

MEAD POND.

Mead Pond, located near Pound Ridge, New York, about eleven miles north of Stamford, was bought in 1891. It has a drainage area of about eight square miles, with a water surface of forty-five acres and a capacity of eighty-eight million gallons. The average depth is about six feet. This supply is used only during very dry weather, as Trinity Lake and the Stamford Reservoir are adequate for the needs of the city under ordinary conditions.

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STAMFORD RESERVOIR.

Stamford Reservoir, formerly known as Coxes Pond, was acquired in 1871, and at that time had a capacity of only thirty million gallons. In 1909 a new dam was constructed, increasing the capacity to five hundred and twelve million gallons. This reservoir is the distributing supply and is located about five miles north of the city. It has a drainage area of about thirteen square miles and a water surface of 114.2 acres, with an average depth of 13.7 feet.

About twenty thousand people are served by the company and the daily consumption is estimated at two and a half million gallons, or about 125 gallons per capita. The company has in use about fifty-five miles of four to thirty-inch mains. One-inch galvanized iron service pipe is used.

The entire drainage area has been carefully inspected and the following is a detailed account of the conditions found at each house. The houses have been numbered to correspond to the numbers locating them on the accompanying map.

INSPECTION OF WATERSHED.

No. 1. J. D. place. Four in family. Seven horses and two cows on the premises. Box privy. Health of family good. No brook nearby. Toilet in the house empties on the meadow. Have a few summer people at times.

No. 2. Mrs. F. place. Two in family. Two horses and one cow on premises. Toilet and sink drain to a cesspool. Health of family good. No brook nearby. Barn and cesspool on opposite side of road from the house.

No. 2. Mr. A. place. Two in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 4. Mrs. S. place. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 5. E. V. W. place. Three in family. Two horses and three cows on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 6. W. A. place. Two in family. One horse on the premises. Not near any brook.

No. 7. G. M. place. Three people in house. No stock kept here. Wastes go to a cesspool. No stream nearby.

No. 8. Dr. W. place. Five in family. Three horses, one cow and one pig on the premises. Cesspool about 200 feet from a stream receives toilet and sink wastes. Health of family good. Workman's house below the barn.

No. 9. E. R. place. Three in family. One horse, four cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 10. J. R. T. place. Two in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 11. Mr. Z. place. Six in family. Two horses, two cows and two pigs on the premises. Hole under privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 12. Mr. Y. place. Two in family. No stock. Hole under privy. No sink in the house. Health of family good. No brook nearby.

No. 13. Mr. B. place. Five in family. One horse, one cow and two pigs on the premises. Hole under privy. Sink drains under ground. Health of family good. No brook nearby.

No. 14. Mrs. T. place. Seven in family. Two horses and one cow on the premises. Toilet and sink drain to a cesspool. Health of family good. No brook nearby.

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No. 15. Mrs. D. place. Three in family. No stock. Health of family good. Drainage goes about 280 feet to a cesspool. Outbuildings drain into another watershed.

No. 16. Mr. B. place. Ten in the house. Five horses, two cows and two pigs on the premises. Cesspool receives drainage from toilet and sink. Health of family good. No brook nearby. Gardener's house drains to another watershed.

No. 17. Mr. D. place. New house under construction. No brook nearby.

No. 18. H. B. D. place. Four in family. Two horses and four cows on the premises. Toilet and sink drain to a cesspool. Health of family good.

No. 19. H. J. D. place. Four in family. One horse on the premises. Toilet and sink drain to a cesspool. Health of family good. No brook nearby.

No. 20. J. K. place. Four in family. No stock. Privy has a cellar. No sink drain. Health of family good. Brook about eighty or ninety feet distant.

No. 21. Dr. W. place. Five people in the main house with four in smaller house on the opposite side of the road. Wastes go to a cesspool about 400 feet from the stream.

No. 22. J. C. place. Eight people in the house. Four pigs kept on the premises. Ground privy and house slops thrown on the ground. Privy about 200 feet from stream with rather steep grade. Place is empty now, December 9, 1912.

No. 23. H. McH. place. No one here at time of inspection. Cesspool here and is located about 150 feet from stream, but overflow is carried away from stseam on account of topography.

No. 24. W. W. D. place. Nine people in the house. Five horses, five cows and eight pigs on the premises. Wastes go to a cesspool. No brook nearby. Five people in foreman's house back of No. 24.

No. 25. C. E. place. Six in family. Privy has a cellar. No sink in the house. Health of family good. No brook nearby.

No. 26. J. G. place. Three people in the house. Three horses, two cows and two pigs on the premises. Ground privy and sink drain emptying on the ground. No stream nearby.

No. 27. Mrs. W. H. place. One person here. No stock kept here. Ground privy, and sink drain discharges on the ground, but no stream nearby.

No. 28. Mrs. F. B. place. One person in the house. No stock kept here. Privy has no vault and sink drains on the ground. No brook nearby.

No. 29. W. W. place. Four people in the house. Two horses and two cows on the premises. Privy has no vault and sink drain empties on the ground. About 150 feet to nearest brook but drainage, on account of topography, would have to go considerably farther.

No. 30. C. A. J. place. Six in family. Two horses and five cows on premises. Hole under privy and sink drainage goes to a cesspool. Privy 200 feet and barn 300 feet from nearest brook. Health of family good.

No. 31. R. C. place. Two in family. One horse and one cow on the premises. Privy has a cellar. No sink in the house. Health of family good. House about 500 feet from brook.

No. 32. R. J. B. place. Eight in the family. Two horses on the premises. Privy has a vault. Health of family good. An old house about 300 feet from brook.

No. 33. F. S. S. place. Four in the family. No stock. Privy has a vault. Sink drain goes underground to a small cesspool. Health of family is good. Barn on the opposite side of the road. No brook nearby.

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No. 34. Mrs. E. S. place. Three in family. No stock. Health of family good. Use No. 33 privy.

No. 35. E. W. place Four in family. Five horses and three cows on the premises. Privy has a cellar. Underground sink drain. Health of family good. No brook nearby.

No. 36. J. R. B. place. This is a new house. House is about 400 feet from brook. Brook is 600 feet from barn cesspool.

No. 37. A. H. M. place. Seven in family. No stock. Health of family good. Three or four pigs in a swale near the cross road.

No. 38. G. A. place. Two in family. Ground privy and cesspool for sink drain. Health of family is good. Three persons in a bungalow next to the house. No brook nearby.

No. 39. A. H. M. place. Ground privy. Sink discharges on the ground. Place is vacant. No brook near.

No. 40. A. H. M. place. Mr. M. is caretaker. One in the house. No stock. Cesspool, privy and sink drain. Health is good. No brook nearby.

No. 41. Mrs. H. A. P. place. Four in family. One horse on the place. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 42. A. B. O. place. Two in the family. One horse on the premises. Ground privy. Sink drains on the ground. Health of family is good. A small brook runs through the barnyard but the place is clean. This place is on the edge of the watershed to Mead Pond.

No. 43. C. W. place. Four in family. One horse on the premises. Ground privy. No sink in the house. Health of the family is good. Mr. W. lives in a small house and the main house is not occupied. No brook near.

No. 44. T. J. place. Four in family. Three horses, one cow and one pig on the premises. Ground privy. No sink in the house. Health of family is good. No brook nearby.

No. 45. C. S. place. Closet on swamp which runs to a brook. Three in the family.

No. 46. L. S. place. Two in family. One horse on the premises. Privy has cellar. Ground sink drain. Health of family is good. No brook near. Stable on the opposite side of the road about 300 feet from nearest brook. Privy on edge of swamp. Should be watertight or moved.

No. 47. F. B. S. place. Four in the family. Three horses, one cow and four pigs on the premises. Ground privy. Sink drains on the ground. Health of family is good. Swampy area at rear but no running water.

No. 48. O. B. place. Four in family. One cow on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 49. H. B. place. Two in family. One horse, one cow and one pig on the premises. Privy has a cellar. No sink in the house. Family in good health. No brook near.

No. 50. Mrs. M. place. No one lives here. House is only partly built.

No. 51. W. S. place. A workshop 150 feet from the brook. Sanitary conditions good.

No. 52. G. W. place. Two in family. No stock. Ground privy, and sink drain empties on the ground. Health of family good. No brook nearby. This is a summer place.

No. 53. Dr. E. P. W. place. Four in family. No stock kept. Ground privy, and sink drain empties on the ground. Health of family good. This is a summer place. No brook nearby. Not used much.

No. 54. School house. Box under privies. About 50 feet from brook. Privies are located in a swale. Not very satisfactory.

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No. 55. E. A. N. place. Three in family. No stock kept. Ground privy, and no sink in the house. Health of the family is good. No brook nearby.

No. 56. H. R. place. Five in the family. Two horses on the place. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 57. C. S. place Thirty-one in the house. One horse, three cows and three pigs on the premises. Box privy and sink drain discharges on the ground. Summer boarders kept here. No brook nearby.

No. 58. W. S. place. Two in family. One horse on premises. Ground privy, and no sink in the house. Privy 250 feet and barn 150 feet from small brook. Barn and privy on the opposite side of the road from brook. Not dangerous.

No. 59. W. H. C. place. Five in family. One horse, two cows and one pig on the premises. Toilet and sink drain go to a cesspool. Barn has cesspool. Health of family good. Water in the house.

No. 60. N. L. place. Five in family. Two horses and four cows on the premises. Privy has a vault and sink drain empties on the ground. Privy about 50 feet from a small brook on the ground level. Health of family good. Small stream passing across the road and back of the house. Barn on level ground. Not serious.

No. 61. E. L. E. place. Four people in the house. Two horses, three cows and two pigs on the premises. Ground privy, and sink drain emptying on the ground. House 75-100 feet and barn 200 feet from nearest stream.

No. 62. W. P. place. Six in family. One horse and two cows on premises. Ground privy. No sink in the house. Health of family is good. Two small tenement houses here. No brook near.

No. 63. Dr. H. place. No stock. Privy has a cellar. Sink discharges on the ground. This is a summer place. No one here at time of inspection. No brook nearby.

No. 64. G. J. place. Four people in the house. One horse, four cows and four pigs on the premises. Ground privy, no sink drain. No brook nearby.

No. 65. W. W. D. place. One in the house. No stock here. Ground privy, and sink drain emptying on the ground. No brook nearby.

No. 66. Mrs. T. S. S. place. One in the house. No stock. Privy has a vault and sink drains on the ground. Health good. No brook nearby.

No. 67. Mrs. K. place. Three in family. One horse on the place. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 68. R. W. place. Three people in family. No stock. Privy has a cellar. No sink in the house. Health of the family is good. No brook nearby.

No. 69. R. J. M. place. Ten in family. Hole under privy and no sink in the house. Eight cases of typhoid in family during 1910. Marshy land about 80 feet from the front of house. No brook nearby.

No. 70. J. C. place. Place used only over Sunday during summer season as a rule. Ground privy, no sink drain. Barn about 70 feet from a swamp area but the barn has not been used for some time.

No. 71. W. W. place. Four people in the house. One horse on premises. Privy has a stone cellar. No sink. Privy 60, and barn 50 feet Mr. W.'s son. Small manure pile 10 feet fro mbrook.

No. 72. A. H. McD. place. Two people in the house. No stock kept. Privy has a cellar No sink drain. Privy 20 and barn 10 feet from stream. Health of family good. Typhoid here one year ago last fall. Mr. W.'s son. Small manure pile 10 feet distant.

No. 73. P. J. place. House is vacant. Ground privy. No sink in the house. No brook nearby.

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No. 74. L. P. place. Two in family.One horse, two cows and two pigs on the premises. Privy has cellar. No sink in house. Health of family good. No brook near but there is a flat marshy place at the rear of house.

No. 75. F. I. P. place. Thirteen in family. Two horses, two cows and seven pigs on the premises. Ground privy, and no sink drain. Health of the family is good. Chicken coop and pig pen close to a spring which drains to a small pond about 70 feet distant. Pig yard about 75 feet from pond. Privy is filthy but about 250 feet from pond.

No. 76. N. S. place. Six in family. Three horses, two cows and two pigs on place. Ground privy. No sink in house. Health of family good. No brook nearby.

No. 77. C. F. B. place. Summer place and no one here at time of inspection. No brook nearby. There is a little barn 100 feet from a small pond.

No. 78. L. F. B. place. House is vacant. Used only in the summer time. No brook near.

No. 79. J. S. place. Two in family. One horse and one cow on premises. Ground privy. No sink in house. Health of family good. Barn and wagon house across road from house. No brook near.

No. 80. Mrs. W. M. place. Five in family. Ground privy, and sink drain discharges on the ground. Health of family is good. This is a summer place and used only about two weeks at a time. No brook nearby.

No. 81. New house under construction opposite No. . No brook near.

No. 82. A. S. place. Three in family. One horse and one cow on premises. Privy has a cellar. No sink in the house. Health of family good. No brook near. Barn on the opposite side of the road. Swampy place at rear but no running water.

No. 83. W. B. place. Seven in the family. No stock. Ground privy. No sink in the house. Privy about 150 feet from pond. Health of family good. Pond 150 feet from house. An old lady lives in a small house in the yard of No. 83.

No. 84. V. C. place. Two in family. One horse on the premises. Ground privy. Health of family good. Used as a summer place, about 150 feet from brook.

No. 85. C. T. place. Two in family One horse on the premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 86. L. J. place. One in the house. No stock. Ground privy. No sink in the house. Health good. No brook near.

No. 87. A. J. place. Two in the family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 88. J. B. B. place. Two in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 89. Mrs. I. H. M. place. Four in family. Two horses, three cows and eleven pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 90. S. S. place. Two in family. No stock. Ground privy. Sink wastes thrown on the ground. Health of family good. No brook near.

No. 91. B. McK. place. Two in family. No stock. Ground privy. Sink wastes thrown on the ground. Health of the family is good. No brook near.

No. 92. B. S. place. Three in family. One horse on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 93. C. S. place. Two in family. One horse, six cows and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook near.

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No. 94. Mr. L. M. place. Two in family. Two horses and one cow on the premises Ground privy. No sink in the house. Health of family good. No brook near.

No. 95. W. R. B. place. Two in family. Two horses and one cow on the premises. Cellar under privy. No sink in the house. Health of family good. No brook near.

No. 96. R. A. G. place. Three in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 97. C. P. place. Five in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 98. Mr. S. B. place. Eight in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 99. C. W. place. Four in family. Two horses, ten cows and two pigs on the premises. Ground privy. No sink in the house. Privy about 100 feet and barn 350 feet from a small brook. A garden between brook and privy. Health of family good.

No. 100. School house. No brook near.

No. 101. R. W. place. Five in family. Two horses, three cows and two pigs on the premises. Ground privy. Sink drain discharges on the ground. Health of family good. No brook near.

No. 102. C. B. place. Two in family. One horse on premises. Toilet and sink drain to a cesspool. Running water and bath in the house. Pond across the road 150 feet from the barn.

No. 103. Mr. F. S. place. Three in the family. No stock. Ground privy. No sink in the house. Privy 40 feet from brook. Health of family is good.

No. 104. Mr. A. S. place. One in house. No stock. Ground privy. No sink in the house. Privy 60 feet and barn 80 feet from brook. Intervening land is level. Barn not used now.

No. 105. C. H. B. place. Eight in family. Four horses and three cows on the premises. Ground privy. No sink in the house. Health of family good. Privy about 150 feet from brook.

No. 106. R. W. place. Five in family. Two horses, fourteen cows and six pigs on the premises. Ground privy. No sink in the house. Health of family is good. No brook near.

No. 107. E. F. B. place. Two in family. Ground privy. Sink drain discharges on the ground. Privy 150 feet and barn 50 feet from nearest brook. Health of family good.

No. 108. Mrs. E. S. place. Two in family. No stock. Ground privy. Sink drain discharges on the ground. Health of family is good. No brook nearby.

No. 109. Vacant house. No brook nearby.

No. 110. G. L. P. place. Five in family. Two horses, one cow and four pigs on the premises. Ground privy. Sink drain discharges on the ground. Health of family good. No brook nearby.

No. 111. J. J. place. Place is vacant and in a dilapidated condition. A ditch runs through the yard. Will probably not be used.

No. 112. H. S. place. One person in the house. Two cows and two pigs on the premises. Ground privy. No sink in the house. Health of occupant good. No brook near.

No. 113. J. R. P. place. Two in family. One horse and two cows on the premises. Ground privy. No sink in the house. Health of family is good. No brook nearby.

No. 114. L. H. place. Two in family. One horse, one cow and one pig on the premises. Health of family good. No brook nearby. Ground privy. Sink drain discharges on the ground.

No 115. S. S. C. place. Three in family. Three horses on premises. Toilet and sink drain to a cesspool. Health of family is good. Cesspool is one-fourth mile from stream.

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No. 116. G. T. place. One horse and one cow on the premises. Ground privy. Sink wastes thrown on the ground. Health of family is good. No brook nearby.

No. 117. A. F. place. Six in family. Two horses and two cows on premises. Ground privy. Small area of swampy land back of the house. No brook near. Barn across the road from the house and about 60 feet from small brook. House 150 feet from brook.

No. 118. L. E. R. (Stamford Water Co.) place. Three in the family. One horse and one cow on the premises. Ground privy. No sink in the house. Health of family good. Barn 150 feet from a pond.

No. 119. W. M. place. Five in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 120. S. S. place. Four in family. One horse on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 121. Mr. C. V. place. Five in family. One horse on the premises. Ground privy. No sink in the house. Health of family is good. Steep grade at rear of house but no brook near.

No. 122. C. S. place. House is empty. No brook nearby.

No. 123. Mr. S. B. place. Six in the famly. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 124. E. C. S. place. Four in family. One horse and two cows on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 125. Mrs. L. S. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 126. C. D. place. Two in family. No stock. Privy 150 and barn 300 feet from brook. Steep grade from privy. Health of family good.

No. 127. F. T. place. This is a summer place and was vacant at time of inspection. No brook nearby.

No. 128. T. S. place. Seven in family. One horse and one cow on the premises. Ground privy. Sink drains on the ground. Health of family good. Privy at edge of dry stream bed. Manure pile on opposite side of stone wall from stream. Conditions bad.

No. 129. G. N. S. place. One in the house. No stock. Ground privy. No sink in the house. Health of family good. Barn on opposite side of road from house. No brook near.

No. 130. S. S. place. Three in the family. Two horses, one cow and two pigs on the premises. Ground privy. No sink in the house. Health of family good. Work shop across the road from house and about 150 feet from a small pond.

No. 131. W. place. House vacant. Ground privy. No brook near.

No. 132. T. D. place. Fourteen in the house. Eight horses and two cows on the premises. Ground privy. No sink in the house. Health of people good. No brook nearby.

No. 133. W. D. place. Seven in family. No stock. Privy 75 feet from brook. Health of family good. House about 50 feet from brook. Conditions here are not bad at present but company should control this property.

No. 134. S. W. place. Three in family. Two horses, one cow and two pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 135. School house. Privy has a stone lined pit. No brook near.

No. 136. Mrs. R. place. Three in family. No stock. Ground privy. No sink in the house. No brook nearby.

No. 137. J. C. place. Four in family. One horse and one pig on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 138. Empty house. Ground privy. No brook nearby.

No. 139. An old house which will probably not be used again.

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No. 140. F. A. place. Three in family. No stock. Privy has a vault. No sink in house. Health of family good. Privy about 125 feet from mill pond. Conditions not bad as ground is fairly level.

No. 141. A. M. place. Four in family. No stock. Ground privy. Sink drain discharges on the ground. Health of family good. Brook not near.

No. 142. H. N. place. Three in family. Ground privy and cesspool for sink drain. One horse and one cow on the premises. Health of family good. This place has been sold to the M. estate. No brook nearby.

No. 143. A small church. No brook nearby.

No. 144. An empty house. No brook nearby.

No. 145. Mrs. E. J. J. place Two in family. No stock. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

No. 146. H. C. B place Six in family. One horse, one cow and six pigs on the premises. Privy has a box for wastes. Sink drains on the ground.

No. 147. Mr. J. D. place. No stock. Ground privy. Privy 200 feet from a brook. Place used only at intervals in the summer. Steep grade back of privy and location is not very satisfactory.

No. 148. G. D. place. Two in family. No stock. Health of family good. No brook nearby.

No. 149. Mr. S. S. place. Three in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 150. School house. No brook nearby.

No. 151. W. D. place. Four in house. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 152. W. W. place. Ground privy. Sink drains on the ground. Place is empty now. No brook nearby.

No. 153. W. P. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. About 400 feet from the house to a stream. Steep grade but conditions are not bad.

No. 154. A. C. place. Two in family. One horse on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 155. L. B. S. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 156. A. F. place. One in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 157. H. R. place. Two in family. One horse on place. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 158. S. R. place. Four in family. One horse on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 159. Mrs. C. D. place. Three in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 160. J. E. P. place. Six in family. Three horses, thirteen cows and five pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 161. S. W. place. Two in family. Ground privy. No sink in the house. Health of family good. No brook nearby. No stock.

No. 161A. C. W. place. Five in family. One horse on place. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 162. F. C. F. place. Four in family. One horse on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 163. W. W. C. place. Four in family. Two horses on the premises. Toilet and sink drain to a cesspool. Health of family is good. No brook near.

No. 164. W. H. S. place. Four in family. One horse, three cows and

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two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 165. S. D. O. place. Three in family. One horse, one cow and two pigs on the premises. Ground privy. Sink drain goes to a cesspool. Health of family good.

No. 166. L. F. place. Two in family. One horse, two cows and two pigs on premises. Sink drains on the ground. Health of family good. No brook nearby.

No. 167. H. B. place. Seven in family. One horse and two pigs on premises. Ground privy. No sink drain. Health of family is good. No brook nearby.

No. 168. W. W. place. Two in family. One horse. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 169. Mrs. L. J. K. place. Four in family. Two horses, two cows and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 170. L. B. place. Place is empty. Ground privy. No sink in the house. No brook nearby.

No. 171. W. B. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 172. G. S. place. Two in family. One horse on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 173. M. T. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 174. T. H. place. Six in family. One horse and two pigs on the premises. Ground privy. No sink in the house. Health of family good.

No. 175. H. W. place. Four in family. One horse and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No 176. W. W. place. Ten in family. Three horses, one cow and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 177. C. H. R. place. One horse and two pigs on the premises. Ground privy. Sink drains on the ground. No brook nearby.

No. 178. Mrs. M. place. One in the house. No stock. Ground privy. No sink in the house. Health of occupant good. No brook nearby.

No. 179. H. S. place. Three in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near. Swampy land back of house but no running water at time of inspection.

No. 180. F. L. place. Eight in family. Two horses, one cow and three pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 181. E. B. place. Six in family. One horse, two cows and three pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 182. Italian shanty. Three in family. Ground privy. No sink in the house. No stock. Health of family good. Italian laborers living here board at No. 181. No brook nearby.

No. 183. J. G. place. Five in family. One horse and two pigs on the premises. Toilet and sink drain to a cesspool. Health of family good. No brook near.

No. 184. A. F. place. One in the house. No stock. Ground privy. Health of occupant good. No brook nearby.

No. 185. W. B. place. Eight in family. One horse and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 186. J. B. place. Five in family. One horse and two pigs on the

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premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 187. East Woods Church. No brook near.

No. 188. A. C. place. Three in family. One horse, two cows and two pigs on the premises. Ground privy. No sink in the house. Privy 180 feet and barn 150 feet from brook. Health of family good. Place is not bad under present conditions.

No. 189. S. R. place. Seven in family. Two pigs on place. Ground privy. No sink in the house. Health of family good. No brook near.

No. 190. Mrs. W. H. place. Thirteen in the house. One horse and two cows on premises. Ground privy. No sink in the house. Privy about 120 feet from brook. Health of family good. Considerable grade here. Location of privy should be changed.

No. 191. H. R. R. place. Six in family. One horse, one cow and two pigs on the premises. Ground privy. No sink in the house. Health of family is good. No brook nearby. Swamp area back of the pig pen and barn, about 20 feet distant, but no running water at this time.

No. 192. W. V. place. One in family. One horse on premises. Shallow hole under privy. No sink in the house. Privy 100 feet and barn 150 feet from brook. Health of family good. House 50 feet from brook. Conditions here are apparently good at present but the company should own this property.

No. 193. Mr. J. G. place. Five in family. Three horses, two cows and one pig on the premises. Ground privy. No sink in the house. Privy about 125 feet, barn 70 feet from brook. Health of family good. House is 60 feet from brook. Barn drainage would have to go a considerable distance as there is a rise between it and the brook. Brook between house and barn. Privy on a little slope but no running water at rear. Company should control this property. Brook rises at rear of house. Stable manure pile about 100 feet from brook but the ground is nearly level.

No. 194. R. R. place. Five in family. One horse and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 195. C. T. place. Four in family. One horse and eleven pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 196. J. N. M. place. Three in family. One horse, three cows and one pig on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 197. Mrs. J. M. place. Four in family. Four pigs on the premises. Ground privy. No sink in the house. Privy about 100 feet and barn 60 feet from brook. Health of family good. House about 60 feet from a stream on the opposite side of the road. Privy appears to be in a sanitary condition.

No. 198. G. I. R. place. Nine in family. Two horses, four cows and one pig on the premises. Ground privy. Sink drains on the ground. Health of family good. Small stream passes through the yard but is covered. Garbage appears to have been thrown over the cover on stream. Main stream 250 feet distant.

No. 199. Mrs. G. R. place. One in house. No stock. Ground privy. No sink in the house. No brook nearby. A wagon house about 50 feet from small brook.

No. 200. S. A. place. Three in family. No stock. Ground privy. No sink in the house. Small brook and swamp land about 50 feet from the house.

No. 201. G. D. place. Eight in family. Two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 202. H. S. place. Three in family. One horse, three cows and

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two pigs on the premises. Privy is dug out. No sink in the house. Privy about 380 feet, barn 350 feet and house 300 feet from Trinity Lake. Health of family good. Mr. S. is the caretaker for Trinity Lake.

No. 203. A. S. place. Three in family. One horse, two cows and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 204. S. D. place. Two in family. Ground privy. Sink drains on the ground. No stock. Health of family good. No brook nearby.

No. 205. A. H. W. place. Five in family. Three horses on the premises. Ground privy. Sink drains on the ground. Privy 50 feet from brook. Health of family good. Saw and cider mill at side of brook. Stream power. Barn directly over brook. Whole place is in bad condition.

No. 206. School house. Ground privy. No brook nearby.

No. 207. G. S. place. Three in family. Two horses, three cows and seven pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 208. S. A. P. place. Three in family. Two horses on premises. Ground privy. Sink drains to a small cesspool. Health of family good. No brook near.

No. 209. S. A. P. store.

No. 210. Church.

No. 211. C. E. N. place. Four in family. Six horses, seventeen cows and thirteen pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 212. G. E. D. place. Two in family. Four horses, two cows and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 213. E. W. place. Six in family. One horse, three cows and one pig on premises. Health of family good. No brook nearby.

No. 214. J. W. S. place. Two in family. One horse, two cows and three pigs on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 215. C. D. place. Four in family. Two horses on the premises. Ground privy. No sink in the house. Health of family good. Privy about 250 feet from stream but location is not bad and premises are clean. Barn not near brook.

No. 216. A. A. place. Two in family. One horse on premises. Ground privy. No sink in the house. No brook nearby.

No. 217. F. S. place. Has been vacant for two or three years. No brook near.

No. 218. Dr. E. W. T. place. Three in family. Six horses and eleven cows on the premises. Health of family good. No brook nearby. Toilet and sink drain go to a cesspool. This is a summer place.

No. 219. Mr. W. F. place. Six in family. Ground privy. Sink drain discharges on the ground. Health of family good. No brook nearby.

No. 220. F. E. W. place. Two in family. Ground privy. Sink drain discharges on the ground. Health of family good. No brook nearby.

No. 221. C. D. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. Not near any brook.

No. 222. F. L. S. place. Two in family. One cow on premises. Ground privy. Sink drain discharges on the ground. Privy 100 feet and barn 100 feet from brook. Health of family good. Duck pond 50 feet from the house. Large number of ducks kept here.

No. 223. E. P. place. Place closed at time of inspection. No brook nearby.

No. 224. Church. No brook near.

No 225. F. S. place. Five in family. One horse and one cow on

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premises. Ground privy. Sink drain discharges on the ground. Health of family good. No brook near.

No. 226. Miss L place. Two in house. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 227. L. S. place. Three in family. Two horses on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 228. G. S. place. Two in family. One horse on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 229. W. C. place. Three in family. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 230. House has been empty for about a year. Ground privy. No brook nearby.

No. 231. N. B. S. place. Two in family. One horse on premises. Ground privy. Sink drains on the ground. Privy about 90 feet and barn 60 feet from brook. Health of family good. Conditions not insanitary at present but place should be controlled by the water company.

No. 232. W. J. place. Three in family. One cow on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 233. E. E. M. place. Five in family. Four horses, three cows and five pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby. The barns are on the opposite side of the road from the house.

No. 234. Empty cottage. No brook nearby.

No. 235. E. M. place. Three in family. One horse, one cow and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 236. Empty house. Ground privy. No sink in the house. No brook nearby.

No. 237. W. N. place. Four in family. One horse, one cow and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 238. M. F. place. House empty at time of inspection. Ground privy. No brook nearby.

No. 239. W. S. R. place. Two in family. Three cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 240. J. S. place. Five in family. One horse, one cow and two pigs on premises. Ground privy. No sink in the house. Health of family is good. Pigs have access to a small brook, which passes about 90 feet from the house. Premises clean. Barn and privy will drain a considerable distance before reaching the brook.

No. 241. Mrs. A. J. S. place. Five in family. One horse, one cow and two pigs on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 242. Water Company's property. Used as a summer place. Has steep grade. House and privy about 250 feet from Lake.

No. 243. C. W. and J. D. place. Two in family. Two horses, two cows and two pigs on the premises. Stone vault under privy. No sink in the house. Privy 150 and barn 150 feet from brook. Health of family good. Grade steep. Place should be controlled by the water company if possible.

No. 244. R. V. N. place. Three in family. Two pigs on premises.

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Ground privy. No sink in the house. Privy 150 feet from brook. Health of family good. House 100 feet from brook.

No. 245. C. W. place. Three in family. One horse and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 246. J. R. place. Five in family. Three horses, three cows and three pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 247. T. R. place. One in the house. No stock. Ground privy. No sink in the house. Health of occupant good. No brook nearby.

No. 248. This place is empty. Ground privy. No brook nearby.

No. 249. L. S. place. One in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 250. A. S. place. Four in family. Two horses, two cows and two pigs on the premises. Ground privy. No sink in the house. Health of family good. Mrs. S. had typhoid fever seven or eight years ago. No brook nearby.

No. 251. A. S. place. Six in family. One horse, two cows and two pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 252. I. O'B. place. One in the house. No stock. Ground privy. No sink in the house. Health of family good. Gully about 125 feet from rear of house but no water flowing at time of inspection.

No. 253. Mr. R. and Mr. A. place. Two in house. One horse on premises. Ground privy. No sink in the house. Health of both good. No brook nearby.

No. 254. J. S. place. Summer place, vacant at time of inspection. Ground privy. No brook near.

No. 255. I. R. M. place. Four in family. One horse on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 256. A. M. place. Two in house. One horse, two cows and two pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 257. D. H. place. Six in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 258. A summer place. About 60 feet from pond. About sixteen boarders here during season of 1911. Stone pit under privy, and a rise in the ground between privy and pond 35 feet distant, but surroundings are not very satisfactory from a sanitary standpoint.

No. 259. A summer place. About twenty feet from pond. About twenty boarders here during season of 1911. Ground privy about 25 feet from pond but there is a slight rise between privy and pond.

No. 260. J. S. B. place. Five in family. No stock. Health of family good. Country house. No one here at time of inspection.

No. 260A. H. J. C. place. Three in family. One horse, two cows and two pigs on premises. Toilet and sink drain to a cesspool. Health of family good. No brook nearby.

No. 261. T. R. place. Five in family. One horse and eight cows on the premises. Indoor toilet and sink drain to a cesspool. Health of family good. Swamp land below the house. About 500 feet to brook.

No. 262. L. B. place. Two in family. One horse, three cows and two pigs on premises. Ground privy. Sink drains on the ground. Health of family good. House about 100 feet from brook.

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No. 263. J. C. place. Empty house. Barn about 200 feet from brook.

No. 264. J. S. S. place. Three in family. One horse and two pigs on the premises. Privy and sink drain to a cesspool. Health of family good. House and cesspool about 400 feet from stream.

No. 265. H. L. S. place. Used as a summer hotel and about forty people were at the hotel during the season of 1911. Four horses kept on premises. Toilet and sink drain to a cesspool. Not near the stream.

No. 266. Barn only drains to Stamford watershed. No brook near.

No. 267. H. C. place. Eight in family. Two horses and three cows on premises. Toilet and sink drain to cesspool. Health of family good. Chauffeur's house about 80 feet from pond. Barn about 40 and cesspool 100 feet from pond, with a steep grade between water and buildings. Conditions here not very satisfactory.

No. 268. Miss T. place. Four in house. No stock. Ground privy. About 200 feet from brook. Not bad.

No. 269. Mrs. A. O'B. place. One in the house. No stock. Ground privy. No brook near.

No. 270. Mrs. J. K place Three in family. No stock. Ground privy. Sink drain on the ground. Health of family good. Brook about 150 feet from outbuildings.

No. 271. No one here at time of inspection. Swampy land across the road from the house and about 300 feet away. Not bad.

No. 272. B. C. place. Two in family. One horse and one cow on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 273. J. O'K. place. Six in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 274. Mrs. J. M. M. place. Fourteen in the house. Three horses on the premises. Toilet and sink drain to a cesspool. No brook near. Health of people good.

No. 275. R. W. K. place. Four in family. Four horses, six cows and one pig on premises. Ground privy. Sink drains on the ground. Barn about 100 feet from a swampy area, and cows wade in pond about 200 feet from rear of house. Health of family good.

No. 276. C. L. P place. Four in family One horse on premises. Toilet and sink drain to a cesspool. Health of family good. Manure pile about 20 feet from a brook, and cesspool about 125 feet distant. Conditions here should be improved.

No. 277. P. K. place. Two in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 278. W. W. K. place. Four in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 279. Mrs. H. L. T. place. Eight in house. Two horses and three cows on premises. Toilet and sink drain to a cesspool. Health of family good. Brook about 20 feet from barn but manure is kept in cement tank. Cesspool about 60 feet from small pond but outlet discharges through a pipe to a depression with no outlet at some distance from the pond.

No. 280. J. F. place. Two in family. Two horses and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook near.

No. 281. Mrs. B. place. Three in family. No stock. Health of family good. No brook nearby.

No. 282. A. F. place. Four in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

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No. 283. T. P. place. Four in family. One horse on the premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 284. H. B. place. Three in family. Three horses and two pigs on premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 285. W. P. place. Three in family. One horse and three cows on premises. Ground privy. No sink in the house. Health of family good. Large greenhouse here No brook nearby.

No. 286. R. B. place. Three in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 287. E. G. place. Three in family. Two horses, four cows, and two pigs on premises. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 288. Mrs. R. H. place. Two in family. No stock. Ground privy. No sink in the house. Health of family good. No brook nearby.

No. 289. W. B. place. Four in family. Ground privy. No sink in the house. One horse on premises. Health of family good. No brook near.

No. 290. A. F. place Three in family. No stock. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 291. F. K. place. Two in house. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 292. E. H. B. place. Five in family. Three pigs on premises. Ground privy. Sink drains on ground. Health of family good. No brook near.

No. 293. C. T. place. Three in family. Three horses, eight cows and four pigs on premises. Ground privy. Sink drains on ground. Barn about 100 feet from brook but ground intervening is nearly level, and place is clean. Health of family good.

No. 294. S. E. N. place. Four in family. Three horses, three cows and three pigs on premises. Ground privy. Sink drains on ground. Health of family good. Swampy area near house but no running water at time of inspection.

No. 295. S. G. place. Four in family. No stock. Ground privy. No sink in the house. Health of family good. No brook near.

No. 296. A. J. C. place. Three in family. Two cows on the place. Ground privy. No sink in the house. Health of family good. No brook near.

No. 297,

No. 298. Mr. R. G. place. Five in family. Three horses, four cows and two pigs on premises. Ground privy. Sink drains on the ground. No brook nearby.

No. 299. A small school house. No brook nearby.

No. 300. A. K. place. Four in family. Two cows on premises. Ground privy. No sink in the house. Health of family good. About 50 feet from a small stream which runs through a swampy area.

No. 301. J. W. place. Three in family. No stock. Ground privy. No sink in the house. Health of family good. House about 350 feet from brook.

No. 302.

No. 303. R. C. C. No brook nearby.

No. 304. F. E. L. place. Thirty to forty people on the estate. Cess-

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pool and underground filter disposal of house wastes. Health of pepole good.

SUMMARY.

Dainage area for entire system	22	square miles
Total number of houses on drainage area	306	
Total number of people on drainage area.....	1099	
Total number of animals on drainage area.....	801	
Average number of people per square mile	50	
Average number of animals per square miles	36	

Houses and outbuildings located more than 250 feet from a reservoir or its tributary streams are not, ordinarily, considered as seriously menacing the safety of the supply. Within this limit which is, necessarily, an arbitrary one, the danger depends largely upon local conditions. In the consideration of the improvement of sanitary conditions at places where one or more buildings are located within 250 feet of a stream or reservoir, I would suggest the following brief list of regulations which, if carried out, would go far toward the elimination of objectionable and dangerous sources of contamination:

1. That no cesspool, privy or other place for the deposit or storage human excrement should be located within 250 feet of the high water mark of any reservoir, stream, brook, or watercourse, flowing into any reservoir used for drinking purposes.

2. That no cesspool, privy or other place for the deposit or storage of human exccrement should be located within 250 feet of the high water mark of any watercourse or reservoir as above mentioned, unless such receptacle is so constructed that no portion of the contents can escape or be washed into the stream or reservoir.

3. That no house slops, sink wastes, or other polluted water should be discharged on the ground or into the ground within fifty feet of the high water mark of any watercourse or reservoir as above mentioned, and no house slops, sink wastes, or other polluted water should be thrown on the ground within 250 feet of such waters.

4. That no stable, pigpen, chicken house, or other structure where the excrement of animals or fowls is allowed to accumulate, should be located within fifty feet of the high water mark of any watercourse or reservoir as above mentioned, and no structure of this character should be located within 250 feet of the high water mark of such waters, unless provision is made for preventing manure or other polluting materials from flowing or being washed into such waters.

With these rules as a basis the following table has been compiled to show where places are located within 250 feet of the reservoir or tributary streams. Some of the places marked with an asterisk are unsatisfactory at the present time and, I believe, should be remedied as promptly as practicable. The rest, while they do not represent dangerous sources of contamination at this time, may become so later. Places or methods of waste disposal which should be given consideration by the company, are indicated in the following list. In many instances, regular inspection to guard against objectionable changes on the premises is all that is necessary. Conditions as they are at present will be found by referring to the detailed report above.

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Drainage Area House and Number	Sink Wastes	Barn	Privy	Pig Pen
No. 8. Dr. W. place,		†		
No. 20. J. K. place,	†			
No. 22. J. C. place,	†		†	
No. 37. A. H. M. place,			†	
No. 42. A. B. O. place,		†		
No. 45. C. S. place,			†*	
No. 47. F. B. S. place,			†	
No. 54. School house			†*	
No. 58. W. S. place,		†	†	
No. 60. N. L. place,	†		†	
No. 61. E. L. E. place,	†	†		
No. 70. J. C. place,	†	†		
No. 71. W. W. place,	†*	†*	†*	
No. 72. A. H. McD. pl,	†*	†*	†*	
No. 75. F. I. P. place,	†*		†*	†*
No. 77. C. F. B. place,		†		
No. 83. W. B. place,			†	
No. 84. V. C. place,			†	
No. 99. C. W. place,			†	
No. 103. F. S. place,			†*	
No. 104. A. S. place,		†	†	
No. 105. G. H. B. place,			†	
No. 107. E. F. B. place,		†	†	
No. 117. A. F. place,		†	†	
No. 118. L. E. R. place,		†		
No. 126. C. D. place,			†*	
No. 128. T. S. place,	†*	†*	†*	
No. 133. W. D. place,			†*	
No. 147. J. DeM. place,			†*	

Drainage Area House and Number	Sink Wastes	Barn	Privy	Pig Pen
No. 188. A. C. place,		†	†	
No. 190. Mrs. W. H. pl.,			†*	
No. 191. H. R. R. place		†		†
No. 192. W. V. place,		†*	†*	
No. 193. J. G. place,		†*	†*	
No. 197. Mrs. J. M. pl.,		†	†	
No. 198. G. I. R. place,	†			
No. 200. S. A. place,	†			
No. 215. C. D. place,			†	
No. 222. F. L. S. place,		†*	†*	
No. 205. A. H. W. pl.,	†*	†*	†*	
No. 231. N. B. S. place,	†*	†*	†*	
No. 240. J. S. place,				†
No. 243. C. W. & J. D. place,	†*	†*		
No. 244. R. V. N. place,		†	†	
No. 258. A summer place,			†*	
No. 259. A summer place,			†*	
No. 262. L. B. place,	†			
No. 263. J. C. place,		†		
No. 267. H. C. place,		†*		
No. 270. Mrs. J. K. pl.,		†		
No. 275. R. W. K. pl.,	†			
No. 276. C. L. P. place,		†*	†*	
No. 279. Mrs. H. L. T. pl.		†		
No. 293. C. T. place,		†		
No. 300. A. K. place,	†			
No. 140. F. A. place,			†	
No. 141. Mr. J. place,			†	

GENERAL CONCLUSIONS.

The company is to be commended for the protective measures now in effect. Prior to the writer's investigation the entire drainage area had been inspected and mapped under the direction of Mr. Edward L. Hatch, general manager of the company, to whom I am indebted for valuable assistance and for the use of the accompanying map which has been corrected to date for this report. Changes on the map were due, mainly, to the relocation or removal of about fifteen houses following Mr. Hatch's investigation. In addition to Mr. Hatch's general inspection a caretaker is employed for each reservoir, whose duty it is to follow up the tributary streams at regular intervals and to keep the company informed regarding the sanitary condition of the watershed. Another employee patrols the entire drainage area, going over the roads from two to four times per week. Cases of typhoid fever among residents on the watersheds are investigated as soon as reported and the company supplies disinfectants and renders assistance in the disposal of the wastes and the care of the patients while they are on the drainage area. As an extra precaution a calcium hypochlorite plant has been installed in the gatehouse of the distributing reservoir to be used in any emergency which may arise. A system of rewards to physicians and laymen, who report

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cases of illness on the watersheds which prove to be typhoid fever, is now under consideration by the company.

With the above regulations in force it is only fair to say that most of the houses within two hundred and fifty feet of the streams do not represent serious sources of contamination at the present time. On account of their location, however, the foregoing list is made up in order to call attention to all places which should be regularly inspected to guard against changes on the premises which might prove harmful to the supply. Places in the list marked with an asterisk, are unsatisfactory at the present time, and although many of these are a long distance from the distributing reservoir, which has sufficient storage capacity to eliminate accidental contmination under ordinary conditions, the improvement of these places will reduce to a minimum the chance for dangerous contamination to reach the city mains under unusual conditions, such as low water stages in the reservoir followed by heavy rains which might carry infected water through the reservoir to the city before sedimentation and the natural agencies of purification have had time to act effectively.

THE TORRINGTON WATER SUPPLY.

The works are owned by the Torrington Water Company and were begun in 1878. There are now six reservoirs in use, comprising two systems, either of which can be connected up to serve the entire borough. Ordinarily, however, both systems are operated with the connecting gates open.

CRYSTAL LAKE.

Crystal Lake, the distributor for the older system, was built in 1878, and is located about 2.5 miles northwest of the borough as shown on the accompanying map. It has an area of 5.5 acres with a capacity of 18 million gallons and an average depth of ten feet. In addition to a drainage area of 3.06 square miles which includes a small area diverted by a dam southwest of the lake, it receives the flow from Hatchalousie Lake and Whist Pond. A small diversion dam at the head of the reservoir with two mains from this dam to the gatehouse can be connected up to draw water directly from the stream into the mains. The arrangement was installed in 1893 to avoid the use of the reservoir water during warm weather when algae growths were prevalent. There are seventeen houses on the drainage area with a population of 87, equivalent to 28 per square mile.

HATCHALOUSIE LAKE.

This supply, located about 4.5 miles northwest of the borough was built in 1882. It has a water surface of 19.5 acres, a capacity of 53 million gallons and drains an area of 1.45 square miles. It is used as a storage supply for Crystal Lake, flowing by gravity to the latter through a natural watercourse.

There are nine houses on the drainage area with a population of forty-eight, equivalent to thirty-three per square mile.

WHIST POND.

This supply has a drainage area of only .2 of a square mile and was originally a natural pond. In 1891 it was acquired by the water company and the water level was raised about nine feet by means of a dam. The present capacity is about one hundred and twenty million gallons

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and the pond covers an area of forty-one acres. The flow is diverted to a stream on the Crystal Lake drainage area through about 600 feet of open channel and a short stretch of pipe. There are two houses on the drainage area with ten people, or fifty per square mile.

HART BROOK POND.

This supply, located about six miles northwest of the borough, is the distributor for the new system and was built in 1908. It has a capacity of only about 1.3 million gallons, but receives the flow from North Pond and a tributary area of 5.02 square miles. There are eighteen houses on the drainage area with a population of forty-nine, equivalent to ten per square mile.

MARSHALL LAKE.

This reservoir, located about five miles north of the borough, was built in 1905. It drains an area of 1.18 square miles and has a water surface of twenty-two acres with a capacity of forty-four million gallons. The water flows for a short distance through an open channel and is then diverted through a pipe line connecting with the main at the crossroads just north of the Coe Brass Co. reservoir. There are five houses on the drainage area with seventeen people, or fourteen per square mile.

NORTH POND.

The North Pond supply was bought in 1907 and is located about ten miles northwest of the borough. It has a drainage area of 1.02 square miles, a water surface of 106.5 acres and an available capacity of two hundred and forty million gallons. It flows by gravity to Hart Brook Pond through an open brook. There is only one house on the drainage area with three people, or three per square mile.

The entire drainage area has been carefully inspected and the following is a detailed account of the conditions found at each house. (See map, page 157).

TORRINGTON WATERSHED.

No. 1. School house.

No. 2. J. H. place. Five in familly. Four horses, twenty-five cows and one pig on the premises. Indoor toilet drains on the surface of the ground. Sink drains on the ground. Barn 500 feet from brook. Toilet drain outlet 400 feet from nearest brook.

No. 3. J. K. place. Six in family. Four horses, four cows and three pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 4. L. K. place. Seven in family. Three horses, twenty-five cows and four pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 5. C. S. place. Eight in family. Three horses, twenty-eight cows and twelve pigs on the premises. Ground privy. Sink drains on ground. Privy and pig pen about 25 feet from small brook, and a manure pile 30 feet distant. It is evident that wash would reach the brook from these sources during wet weather.

No. 6. C. W. place. Ten in family. Seven horses, sixty cows and five pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook near.

No. 8. D. H. place. Eight in family. Two horses, twenty-four cows and nine pigs on the premises. Ground privy. Sink drains in the

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ground. Health of family good. Small brook passes within fifteen feet of the barn and pig pen. Surface wash from both is inevitable during wet weather.

No. 9. E. C. place. Four in family. Three horses on the premises. Ground privy. Sink drains to a cesspool. Privy 300 feet from brook. Health of family good. About 300 feet to Crystal Lake reservoir.

No. 10. H. C. place. Two in family. No stock. Hole under privy. Sink drains to a cesspool. Privy 20 feet from a little gully and 200 feet from the main brook. Health of family good.

No. 11. A. T. place. Four in family. No stock. Ground privy. Sink drains on the ground. Privy 150 feet from brook. Health of family good. Pond 70 feet from privy but drainage will go below the pond.

No. 12. W. S. place. Six in family. Four horses and fifty cows on the premises. Ground privy. Sink drains on the ground. Privy 300 and barn 200 feet from pond. Health of family good. Small pond 200 feet from barn, and considerable grade from the barnyrd to the pond.

No. 13. J. S. place. Seven in family. One pig on the premises. Ground privy. Sink drains on the ground. Health of family good. Small stream in the road in front of the house, but there is no direct drainage from the outbuildings.

No. 14. K. K. K. place. Five in the family. One horse and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. Ground is wet and springy east and southeast of the house. Small stream by the road in front of the house. Spring and a well in the road in front of Nos. 13 and 14 but no buildings very near. Dirty in front of the well where the stock is watered.

No. 15. Empty house. Ground privy on a hill. No brook near.

No. 16. J. M. place. Three in family. Two horses, twenty-three cows and two pigs on the premises. Box under privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 17. Mrs. J. C. B. place. Five in family. Two horses, ten cows and two pigs on the premises. Hole under privy. Sink drains on the ground. Health of family good. Spring and marshy land about 70 feet from the barn.

No. 18. G. A. place. Four in family. Three horses and fifteen cows on the premises. Stone cellar under privy. Sink drains to a cesspool. Privy 100 and barn 300 feet from brook. Health of the family is good. Fairly level here and premises are clean, but company should control this property as it is rather close to the main stream.

No. 19. R. E. H. place. Three in family. One horse and two cows on the premises. Hole under privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 20. E. H. N. place. Six in family. One horse on the premises. Hole under privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 21. L. H. place. Three in family. Two horses and twenty-five cows on the premises. Ground privy. Sink drains on the ground. Health of family is good. Boy from Torrington staying here at the time of inspection because his sister in the borough is ill with typhoid fever.

No. 23. C. S. place. Six in family. Two horses, fourteen cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 24. M. K. place. Nine in the family. Three horses, seventeen cows and ten pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 25. L. T. place. Two in family. Two horses, six cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. No brook nearby.

No. 26. J. Z. place. Ten in family. Two horses, seventeen cows and

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three pigs on the premises. Ground privy. Health of family good. No brook nearby.

No. 27. C. E. P. place. Two in family. Two horses and twenty cows on the premises. Ground privy. Sink drains on the ground. Health of family is good. No brook nearby.

No. 28. T. K. place. Nine in the family. Two horses, fifty-two cows and twelve pigs on the premises. Ground privy. Sink drains on the ground. Health of family is good. No brook near.

No. 29. J. S. place. Four in the family. Two pigs on the premises. Ground privy. Sink drains on the ground. Health of family is good. No brook nearby.

No. 30. C. K. place. Two in the family. One horse, four cows and two pigs on the premises. Ground privy. Sink drains on the ground. Health of family is good. No brook nearby.

No. 31. R. H. place. Three in the family. One horse and ten cows on the premises. Ground privy. Sink drains on the ground. Health of family is good. No brook nearby. Small school at the cross roads.

No. 32. E. V. H. place. Four in the family. Three horses, twenty-six cows and five pigs on the premises. Ground privy. Sink drains on the ground. Health of the family is good. No brook nearby.

No. 33. M. J. S. place. Two in the family. One horse on the premises. Ground privy. Sink drains on the ground. Privy 300 feet from brook. Health of the family is good. Brook within 250 feet of the house but across the road.

No. 34. L. A. place. Five in the family. Two horses, thirteen cows and five pigs on the premises. Ground privy. Sink drains on the ground. Brook 200 feet from the barn. Health of the family is good. Small brook near the wagon house. House and privy are across the road and not near the brook.

No. 35. J. B. place. Seven in the family. Two horses, seven cows and four pigs on the premises. Ground privy. No sink in the house. Health of family good. Summer camp. Camp Manor next to the J. B. place. At the J. B. place a ridge along the pond keeps out considerable drainage. The house is across the road and about 70 feet from pond. Small pumphouse on the shore. Camp Manor 300 feet from Whist pond.

No. 36. C. K. place. Three in the family. Three horses, twenty-five cows and four pigs on the premises. Ground privy. Sink drains on the ground. Health of family good. Barn about 1,000 feet from pond.

No. 38. J. G. place. Two in the family. One horse and two cows on the premises. Ground privy. No sink in the house. Privy 80 and barn 100 feet from brook. Health of family good. Place is kept clean but company should control this property.

No. 39. L. H. place. Summer boarders kept here. One horse and one cow on the premises. Ground privy. Sink drains on the ground. No brook nearby.

No. 40. G. H. place. Three in the family. One horse and six cows on the premises. Ground privy. Sink drains on the ground. No brook nearby.

No. 41. G. B. place. Eight in the family. One cow on the premises. Ground privy. Sink drains on the ground. Health of family good. Brook within about 200 feet and general sanitary conditions are not very satisfactory here.

No. 42. W. C. McK. place. Three in the family. Four horses and eight cows on the premises. Ground privy. Sink drains on the ground. Health of the family is good. No brook nearby.

No. 43. School house. Ground privy. No brook nearby.

No. 44. Church. Ground privy. No brook nearby.

No. 45. Vacant house. Ground privy. No brook nearby.

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No. 46. Mrs. A. B. place. Three in the family. One horse and one cow on the premises. Ground privy. Sink drains on the ground. Health of the family is good. No brook nearby.

No. 47. M. E. W. place. Two in the family. No stock. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

No. 48. Empty house. No brook nearby.

No. 49. J. K. place. Five in the family. One horse and one cow on the premises. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

No. 50. A. K. place. Six in the family. One horse, three cows and one pig on the premises. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

No. 51. S. A. place. Four in the family. Two horses, six cows and seven pigs on the premises. Ground privy. No sink in the house. About 400 feet to a small brook. The mother has been sick for about a week but the illness was not typhoid fever.

No. 52. H. I. W. place. Four in the family. Two horses, twelve cows and four pigs on the premises. Earth closet. Sink drains on the ground. No brook nearby.

No. 53. P. B. place. Three in the family. Three cows and two pigs on the premises. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

No. 54. L. C. place. Three in the family. Three horses, seventeen cows and six pigs on the premises. Ground privy. Sink drains on the ground. Health of the family is good. No brook nearby.

No. 56. A. W. place. Four in the family. Four horses, twenty-nine cows and twenty pigs on the premises. Ground privy. No sink in the house. Health of the family is good. About 1,000 feet to Marshall Lake.

No. 57. M. P. place. Three in the family. One horse and one pig on the premises. Ground privy. No sink in the house. Health of the family is good. No brook nearby.

SUMMARY.

Drainage area for entire system	11.93 square miles
Total number of houses on the drainage area	54
Total number of people on the drainage area	220
Total number of animals on the drainage area	826
Average number of people per square mile....	18
Average number of animals per square mile..	69

Houses and outbuildings located more than 250 feet from reservoirs or their tributary streams are not, ordinarily, considered as seriously menacing the safety of the supply. Within this limit, which is necessaily an arbitrary one, the danger depends, largely, upon local conditions which affect the chance for surface wash from outbuildings to the stream or reservoir.

Places on the drainage area which should be given consideration are included in the following table. Outbuildings, where the conditions are most objectionable, are marked with an asterisk. The rest, while they do not represent serious sources of contamination at this time, are close enough to the reservoirs or streams to warrant regular inspection to guard against the changes which may prove detrimental to the supply. Conditions existing at these places at the time of inspection will be found by referring to the corresponding numbers in the foregoing detail list.

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CRYSTAL LAKE WATERSHED.

No.	Occupant	Sink Wastes	Privy	Barn	Pig Pen	No.	Occupant	Sink Wastes	Privy	Barn	Pig Pen
5.	C. S. place,	†*	†*	†*	†*	12.	W. S. place,	†		†	
8.	D. H. place,	†*		†*	†*	17.	Mrs. J. C. B. place	†		†	
10.	M. C. place,		†			18.	G. A. place,		†*	†*	
11.	A. T. place,	†	†								

HART BROOK WATERSHED.

34.	L. A. place,	†		†		41.	G. B. place,	†*			
38.	J. G. place,	†	†	†							

GENERAL CONCLUSIONS.

In the above table it will be seen that most of the places where unsatisfactory conditions exist are on the Crystal Lake drainage area. The numerous roads crossing and recrossing tributary streams also represent possible sources of contamination which should be given consideration in the future improvement of the supply.

In plans now under consideration a new reservoir, with a storage capacity of 250 million gallons, is to be built on the stream north of house No. 17, and with this in use, to replace Crystal Lake, the supply will be improved by the greatly increased storage capacity and the elimination of sixteen houses from the drainage area used.

In conclusion, I would say that since the installation of the calcium hypochlorite plant at the Crystal Lake gatehouse in September, 1911, monthly bacteriological examinations have shown that the danger from the use of this water has been practically eliminated. Under existing conditions, however, efficient disinfection of the water depends on intelligent and careful operation of the plant at all times and in order to reduce the chance of human errors in operation, the disinfection plant should, at least, be supplemented with longer storage than is available at present.

September, 1911.

In addition to the foregoing the supplies of Derby, Guilford, Naugatuck, and Windsor Locks have been inspected, but the data on these could not be included in this report.

LABORATORY RECORDS.

The following tables include only records of municipal supplies. Reports on the examination of waters authorized by the county health officers and records of sewage analyses have been filed in the office of the State Board of Health.

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EXAMINATION OF PUBLIC WATER SUPPLIES

ANSONIA—Low Pressure System.

All chemical data given in parts per million.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
2-1843	4-19-11	1	13	37	3.2	.006	064	.000	.00	2.3	18.6	155	0
2-2084	8-28-11	1	15	62	3.0	.000	070	.000	.00	1.7	24.7	16,140*	0
2-2128	9-25-11	5	20	48	3.2	.036	134	.000	.00	2.8	23.7	75	0
2-2177	10-17-11	10	10	45	3.4	.022	112	.000	.00	3.2	21.2	190	0
2-2251	12-13-11	1	15	36	3.4	.022	052	.000	.00	2.8	19.1	70	0
2-2438	6- 4-12	15	25	90	2.8	.006	084	.000	.00	3.3	22.9	375	+
2-2464	6-24-12	5	13	62	2.8	.018	060	.000	.00	2.4	26.1	1,575	0
2-2519	8- 8-12	8	28	40	2.6	.006	160	.000	.00	3.1	20.5	585	0
	Average	6	17	52	3.0	.014	.092	.000	.00	2.7	22.1	430	

*Error in sampling. Not included in the average.

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ANSONIA—High Pressure System.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
2-1842	4-19-11	1	20	37	3.2	.003	.048	.000	.00	3.0	13.9	115	0
2-2083	8-28-11	10	45	40	5.2	.000	.094	.000	.10	2.4	17.5	7,300	0
2-2129	9-25-11	3	35	60	3.2	.046	.192	.000	.00	4.5	18.5	240	0
2-2176	10-17-11	10	30	45	3.2	.042	.146	.000	.00	4.7	19.0	540	0
2-2252	12-13-11	1	20	56	3.4	.016	.070	.000	.00	3.1	17.0	60	0
2-2439	6- 4-12	7	25	40	2.4	.024	.084	.000	.00	3.2	16.9	765	+
2-2465	6-25-12	15	25	34	2.4	.072	.110	.000	.00	3.0	18.2	940	0
2-2598	9-25-12	15	35	47	2.8	.006	.190	.000	.00	3.8	17.0	325	0
	Average	8	29	45	3.2	.026	.117	.000	.01	3.5	17.2	1,285	

Samples collected by the Ansonia Water Company.

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CROMWELL—VILLAGE SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
34-1588	10-11-10	15	22	70	4.90	.024	.104	.000	.04	3.2	46.0	115	0
34-1624	11- 7-10	12	3	52	4.04	.008	.086	.000	.05	4.7	37.0	80	0
34-1661	12- 5-10	9	19	50	4.30	.006	.046	.000	.00	2.8	38.0	78	0
*34-1675	12-12-10	250	600	907	35.00	46.000	11,700	.010	.00	236.30	..	8,500	+
34-1724	1-16-11	15	18	55	3.76	.006	.036	.000	.04	2.4	38.0	85	0
34-1752	2- 6-11	20	25	57	3.44	.014	.042	.000	.15	3.1	31.0	190	0
34-1786	3- 6-11	1	5	50	4.0	.018	.074	.000	.26	2.7	31.0	5	0
34-1819	4- 4-11	1	25	79	4.2	.022	.096	.000	.14	3.2	26.0	220	0
34-1908	5-24-11	3	40	74	4.4	.006	.104	.000	.05	4.6	38.0	475	0
34-1932	6-13-11	1	18	87	4.2	.000	.084	.000	.05	3.1	40.0	350	0
34-1981	7-10-11	1	20	60	4.9	.020	.120	.000	.10	3.2	40.0		+
34-2093	8-31-11	5	40	80	4.2	.002	.120	.000	.00	6.7	36.0	100	0
34-2135	9-28-11	1	25	77	4.8	.016	.134	.000	.00	3.4	41.0	140	+
34-2195	10-25-11	2	30	62	5.2	.026	.112	.000	.40	4.5	35.0	125	+
34-2230	11-27-11	2	25	59	2.6	.050	.140	.000	.80	3.0	33.0	1,115	+
34-2272	12-22-11	1	25	64	4.0	.032	.068	.000	.25	2.4	30.0	180	0

*Contaminated water forced into main through a check valve during a fire. Not included in the average.

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CROMWELL—VILLAGE SUPPLY.—(Continued.)

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
34-2301	1-30-12	1	15	60	4.8	.004	.012	.001	.70	2.0	40.0	75	0
34-2332	2-28-12	50	..	63	2.8	.082	.148	.001	.35	5.2	23.0	3,840	+
34-2357	3-20-12	100	..	61	3.0	.116	.146	.002	.15	3.6	24.0	1,480	+
34-2390	4-30-12	2	30	57	3.3	.006	.116	.000	.13	3.8	31.0	100	0
34-2425	5-23-12	2	20	88	4.7	.012	.098	.000	.30	3.3	30.0	30	0
34-2470	6-27-12	60	85	78	4.6	.054	.180	.001	.00	5.9	43.0	13	+
34-2498	7-18-12	10	38	81	5.6	.012	.340	.000	.20	3.1	39.0	150	+
34-2557	8-28-12	2	27	57	7.0	.012	.170	.000	.20	3.0	44.0	13	+
34-2597	9-24-12	5	28	70	5.2	.054	.110	.000	.40	2.8	39.0	36	0
	Average	13	24	66	4.33	.025	.112	.000	.20	3.4	34.0	390	

Samples collected by a representative of the laboratory.

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DANBURY—WEST LAKE RESERVOIR.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
35-1589	10- 4-10	25	29	62	2.1	.138	.356	.000	.03	5.3	32.0	130	0
35-1627	11- 9-10	15	35	51	2.1	.058	.234	.000	.03	4.9	26.0	55	0
35-1709	1- 4-11	12	15	42	2.2	.014	.104	.000	.12	2.6	25.0	150	0
35-1791	3- 7-11	20	45	68	3.6	.072	.574	.000	.00	8.8	22.0	20	+
35-1866	5- 3-11	10	40	42	2.8	.002	.324	.000	.03	6.6	22.5	1,400	0
35-1938	6-14-11	20	40	61	2.8	.010	.310	.000	.00	6.3	26.3	300	0
35-2001	7-18-11	80	80	75	2.8	.004	.356	.000	.00	10.3	30.0	..	0
35-2148	10- 3-11	40	90	85	2.4	.490	.600	.001	.00	9.0	31.9	2,850	+
35-2391	4-30-12	20	30	36	1.4	.028	.218	.000	.00	5.6	20.1	60	0
	Average	27	45	58	2.5	.091	.342	.000	.02	6.6	25.1	620	

EAST LAKE RESERVOIR.

35-2034	8- 8-11	5	15	51	1.8	.004	.160	.000	.00	4.2	29.3	160	0

Samples collected by the Water Department.

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DERBY.—CITY SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
37-1581	10- 5-10	18	14	41	2.5	.012	.152	.000	.03	4.2	26	175	0
37-1715	1- 9-11	22	35	47	3.0	.008	.178	.000	.05	4.8	19	450	0
37-1753	2- 6-11	20	26	63	3.4	.014	.064	.000	.10	4.4	36	155	0
37-1795	3-15-11	8	18	60	2.9	.008	.080	.000	.07	4.1	20	395	0
37-1823	4-11-11	30	20	65	3.4	.000	.116	.000	.00	4.1	19	95	0
37-1886	5-16-11	3	10	44	3.3	.002	.014	.000	.00	3.7	17	380	+
37-1921	6- 6-11	10	55	51	3.0	.008	.218	.000	.00	6.3	16	1,000	+
37-2006	7-25-11	15	55	69	2.9	.012	.176	.000	.00	7.7	22	..	+
37-2008	7-25-11	25	35	56	3.2	.008	.190	.000	.00	3.5	22	..	0
37-2074	8-22-11	15	30	57	3.6	.000	.174	.000	.00	3.8	24	4,800	0
37-2118	9-20-11	8	20	68	3.4	.034	.186	.000	.00	4.6	22	3,090	0
	Average	15	28	56	3.1	.009	.140	.000	.01	4.6	22	1,170	

Samples collected by the Birmingham Water Company.

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FARMINGTON—BOROUGH SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
52-1582	10- 4-10	8	7	71	1.6	.006	.110	.000	.04	4.6	61	255	0
52-1622	11- 3-10	15	20	62	1.7	.060	.170	.000	.05	5.4	49	135	0
52-1684	12-15-10	30	35	74	4.3	.224	.050	.001	.20	2.3	43	660	0
52-1706	1- 4-11	25	15	74	3.6	.480	.282	.002	.15	4.0	60	640	0
52-1761	2- 9-11	8	9	85	2.4	.560	.084	.000	.03	2.7	56	115	0
52-1794	3-14-11	10	45	103	2.6	.940	.208	.003	.08	4.2	55	140	0
52-1820	4- 6-11	1	10	98	2.7	.076	.058	.005	.35	5.5	53	42	0
52-1868	5- 4-11	1	10	92	2.5	.012	.043	.000	.00	2.9	53	155	0
52-1915	6- 2-11	1	20	125	2.2	.012	.068	.000	.00	4.2	75	410	+
52-1988	7-13-11	2	35	111	2.1	.234	.184	.004	.05	4.5	76	..	0
52-2042	8-10-11	1	25	98	2.0	.012	.104	.000	.30	4.3	69	225	0
52-2104	9-14-11	10	40	86	1.8	.000	.170	.000	.00	6.2	51	105	+
	Average	9	23	90	2.5	.218	.128	.001	.10	4.2	58	260	

Samples collected by the Farmington Water Company.

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GREENWICH.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
57-1615	10-31-10	12	25	54	3.1	.012	.124	.000	.10	3.5	35	90	0
57-1666	12- 6-10	18	26	52	3.2	.012	.102	.000	.10	4.0	34	34	0
57-1746	1-30-11	15	20	75	3.5	.160	.102	.000	.00	3.5	36	170	0
57-1758	2- 8-11	18	26	67	3.8	.142	.060	.002	.08	5.0	36	140	0
57-1811	3-22-11	1	30	57	3.6	.032	.080	.000	.10	4.3	27	280	0
57-1853	4-25-11	1	25	50	3.9	.006	.096	.000	.00	5.2	23	120	0
57-1871	5- 9-11	1	20	41	3.6	.006	.106	.000	.00	3.5	23	18	0
57-1937	6-13-11	1	25	58	4.0	.002	.114	.000	.00	3.4	22	..	+
57-1960	6-27-11	8	35	64	4.0	.006	.108	.000	.00	4.5	25	..	0
57-1961	6-27-11	..	5	73	3.8	.006	.172	.000	.08	5.0	27	..	0
57-1963	6-27-11	1	30	60	3.8	.000	.096	.000	.05	3.2	28	42,000*	0
57-2086	8-29-11	3	20	55	3.6	.000	.062	.000	.00	3.3	31	130	0
57-2087	8-29-11	5	20	82	3.4	.000	.084	.000	.00	3.9	32	570	0
57-2130	9-25-11	8	20	68	3.4	.036	.218	.000	.00	4.4	30	340	0
57-2507	7-24-12	5	28	53	3.3	.054	.220	.000	.00	3.9	30	1,300*	0
57-2508	7-24-12	0	35	50	3.2	.012	.240	.000	.00	4.3	30	11,500*	0
57-2552	8-26-12	3	27	68	3.4	.012	.220	.001	.00	3.9	42	10,400*	0
	Average	6	24	60	3.5	.029	.129	.000	.03	4.0	30	190	

*These bacteria counts not included in the average as the samples were not shipped properly, lack of ice allowing growth during transportation.

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GREENWICH—Mianus River.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
57-1702	12-28-10	10	24	70	4.4	.014	.108	.000	.10	4.6	40	145	0
57-1759	2- 8-11	8	19	58	3.6	.006	.028	.000	.04	3.0	37	305	0
57-1812	3-22-11	1	30	64	3.3	.006	.064	.000	.03	4.1	26	650	0
57-1854	4-25-11	1	30	57	3.6	.004	.062	.000	.00	5.0	25	975	0
57-1870	5- 9-11	1	25	65	3.4	.004	,088	.000	.00	4.5	33	1,215	+
57-1935	6-13-11	5	50	87	2.8	.018	.200	.000	.07	2.0	32	14,500	+
57-2045	8-11-18	20	50	78	5.3	.002	.164	.000	.00	6.3	40	930	+
	Average	6	32	68	3.7	.007	.102	.000	.03	4.2	33	2,675	

Miscellaneous Samples.

57-1760	2- 8-11	20	42	59	3.4	.014	.216	.000	.07	5.3	25	335	0
57-1872	5- 9-11	1	75	65	3.8	.014	.198	.000	.00	7.6	22	1,610	+
57-1936	6-13-11	3	110	97	4.2	.052	.274	.000	.07	11.3	25	6,000	0

Samples collected by the Greenwich Water Co.

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GROTON—BOROUGH SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
59-1703	12-30-10	10	50	74	6.0	.026	.102	.000	.05	8.0	25	125	0
59-1910	5-25-11	3	85	56	6.0	.020	.226	.000	.00	9.5	14	180	0
59-1992	7-17-11	2	55	40	6.0	.012	.174	.000	.00	6.0	15	..	0
59-2077	6-23-11	2	40	50	6.2	.004	.148	.000	.00	5.4	15	925	0
59-2143	10- 2-11	1	55	62	4.8	.022	.246	.000	.00	10.0	17	590	0
59-2382	4-18-12	1	40	41	4.6	.008	.076	.000	.00	5.3	13	85	0
59-2543	8-21-12	8	48	44	5.6	.006	.330	.000	.00	6.0	20	3	0
	Average	4	53	52	5.6	.014	.186	.000	.00	7.1	17	320	

Samples collected by the Groton Water Co.

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HARTFORD CITY SUPPLY—RESERVOIR No. 1.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCO_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
64-1604	10-25-10	14	18	55	2.0	.014	.068	.000	.10	2.3	37	45	0
64-1648	11-22-10	10	14	58	2.1	.006	.062	.000	.04	3.2	38	95	0
64-1692	12-20-10	18	20	60	2.1	.004	.084	.000	.05	5.5	44	55	0
64-1740	1-25-11	18	16	51	2.3	.012	.092	.000	.00	2.8	34	80	0
64-1779	2-21-11	22	15	50	2.1	.006	.068	.000	.00	3.3	38	245	0
64-1804	3-21-11	15	45	90	2.8	.008	.170	.000	.05	6.1	44	..	0
64-1850	4-25-11	3	35	82	2.3	.012	.114	.000	.05	4.0	39	120	0
64-1904	5-24-11	3	40	84	2.2	.050	.162	.000	.00	6.2	41	1,550	0
64-2000	7-19-11	5	18	61	2.2	.002	.082	.000	.00	3.4	32	..	0
64-2071	8-22-11	10	20	93	3.0	.056	.124	.000	.00	3.4	37	220	0
	Average	12	24	68	2.3	.017	.102	.000	.03	4.0	38	300	

RESERVOIR No. 2.

64-1649	11-22-10	8	15	59	2.0	.004	.066	.000	.05	3.0	34	75	0
64-1947	6-21-11	3	10	75	2.6	.000	.122	.000	.00	3.1	27	87	0
64-1975	7- 5-11	2	10	55	2.9	.002	.086	.000	.00	2.7	25	..	0
64-2029	8- 3-11	3	10	82	2.4	.002	.090	.000	.00	3.2	28	500	0
	Average	4	11	68	2.4	.002	.091	.000	.01	3.0	28	220	

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HARTFORD CITY SUPPLY—Reservoir No. 3.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
64-1605	10-25-10	10	9	54	2.0	.008	.068	.000	.00	1.4	41	55	0
64-1987	7-12-11	3	3	56	2.2	.002	.070	.000	.00	1.5	31	..	+
Reservoir No. 4.													
64-2070	8-22-11	25	35	102	3.0	.064	.310	.000	.00	7.4	51	155	0
Reservoir No. 5.													
64-1805	3-21-11	1	10	48	1.6	.022	.112	.000	.05	1.6	13	150	0
64-1851	4-25-11	3	15	47	2.6	.006	.104	.000	.00	2.4	24	380	0
64-1946	6-21-11	1	3	68	2.7	.002	.154	.000	.00	4.0	27	87	0
	Average	2	9	54	2.3	.010	.123	.000	.02	2.6	21	205	

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HARTFORD CITY SUPPLY—RESERVOIR No. 6.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
64-1693	12-20-10	24	16	40	2.2	.008	.082	.000	.10	2.9	29	45	0
64-1741	1-25-11	14	15	43	1.9	.006	.060	.000	.02	3.1	31	135	0
64-1780	2-21-11	14	12	46	2.2	.018	.088	.000	.00	2.2	31	55	0
64-1941	6-15-11	3	10	51	2.6	.000	.116	.000	.00	2.0	24	195	0
64-1956	6-27-11	5	1	57	2.4	.000	.068	.000	.00	2.2	25	800	0
64-1976	7- 5-11	15	15	63	2.4	.004	.102	.000	.00	2.0	28	..	0
64-1986	7-12-11	3	13	48	2.8	.018	.126	.000	.00	2.0	25	..	+
64-1999	7-19-11	5	10	64	2.3	.002	.088	.000	.00	3.2	27	..	0
64-2028	8- 3-11	20	20	43	2.4	.002	.152	.000	.00	2.5	30	180	0
	Average	11	12	50	2.2	.064	.098	.000	.01	2.3	27	235	

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HARTFORD CITY SUPPLY—WELLES POND—TRIBUTARY TO RESERVOIR No. 6.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
64-1856	4-27-11	1	13	61	2.8	.000	.034	.000	.00	2.6	25	115	0
64-1863	5- 3-11	3	15	62	1.9	.008	.042	.000	.00	2.5	28	1,350	0
64-1876	5-10-11	1	10	79	2.6	.006	.044	.000	.00	2.5	32	16,400	+
64-1897	5-16-11	1	15	74	2.6	.008	.056	.000	.00	2.2	40	16,900	+
64-1905	5-24-11	1	10	76	2.4	.000	.076	.000	.00	2.9	40	625	+
64-1914	6- 1-11	3	30	92	2.4	.000	.058	.000	.00	3.8	43	540	+
64-1925	6- 8-11	1	40	84	2.0	.004	.114	.000	.00	6.2	40	3,975	0
64-1942	6-15-11	1	15	77	2.4	.002	.046	.000	.00	2.3	35	820	0
64-1955	6-27-11	5	25	95	2.2	.000	.206	.000	.00	6.0	51	540	0
	Average	2	19	77	2.3	.003	.075	.000	.00	3.3	37	4,585	

Samples collected by the Hartford Water Department.

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MIDDLETOWN CITY SUPPLY—HIGBY MOUNTAIN RESERVOIR.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
89-1591	10-12-10	35	30	56	2.7	.006	.384	.000	.00	5.9	29	130	0
89-1634	11-16-10	30	18	51	3.0	.100	.286	.000	.03	3.0	29	80	0
89-1679	12-14-10	20	20	62	4.3	.180	.194	.000	.15	4.1	38	175	0
89-1732	1-18-11	10	22	67	3.4	.016	.074	.000	.10	5.2	31	195	0
89-1768	2-15-11	16	19	48	3.0	.006	.080	.000	.00	4.5	23	135	0
89-1798	3-16-11	5	35	36	3.5	.001	.084	.000	.00	4.2	20	460	0
89-1840	4-19-11	5	30	54	3.0	.006	.122	.000	.00	3.9	18	15	0
89-1890	5-17-11	3	20	44	2.8	.006	.100	.000	.00	3.6	16	28	0
89-1933	6-14-11	20	20	52	3.0	.038	.146	.000	.00	3.2	17	290	+
89-1998	7-17-11	15	20	62	3.1	.008	.124	.000	.00	2.3	22	..	0
89-2052	8-16-11	50	25	63	3.0	.038	.430	.000	.00	4.4	23	135	+
89-2103	9-14-11	60	35	72	3.2	.000	.148	.000	.00	4.1	23	245	0
89-2178	10-18-11	50	25	56	3.2	.054	.266	.000	.00	3.5	24	340	+
89-2222	11-22-11	10	35	59	3.0	.026	.146	.000	.00	3.4	21	710	0
89-2257	12-20-11	15	30	57	3.0	.070	.118	.000	.00	4.5	21	50	0
89-2283	1-17-12	5	35	53	3.0	.018	.110	.000	.00	4.6	20	105	0
89-2315	2-14-12	2	33	50	2.7	.004	.114	.000	.00	5.7	21	15	0
89-2345	3-13-12	5	25	25	1.4	.020	.120	.000	.00	5.1	13	3,600	0
89-2375	4-17-12	20	30	24	1.8	.010	.136	.000	.00	4.3	17	980	0
89-2407	5-15-12	5	25	43	1.6	.004	.100	.000	.00	0.4	14	15	0

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MIDDLETOWN CITY SUPPLY—HIGBY MOUNTAIN RESERVOIR.—(Continued.)

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
89-2448	6-12-12	20	35	31	1.7	.006	.150	.000	.00	3.5	18	50	+
89-2491	7-17-12	35	25	47	1.6	.018	.280	.000	.00	3.3	22	225	0
89-2534	8-14-12	20	26	43	2.2	.018	.230	.000	.00	2.8	23	37	0
89-2586	9-18-12	15	32	47	2.0	.012	.240	.000	.00	2.4	25	24	0
	Average	11	27	50	2.7	.028	.174	.000	.01	3.9	22	350	

LAUREL BROOK RESERVOIR.

89-1596	10-13-10	25	20	69	2.9	.034	.254	.000	.00	6.5	36	105	0
89-1643	11-21-10	20	15	56	3.2	.122	.194	.000	.06	3.8	36	200	0
89-1683	12-15-10	12	15	61	3.2	.184	.256	.000	.05	4.9	34	45	0
89-1725	1-17-11	25	21	62	4.3	.008	.282	.000	.00	3.6	34	60	0
89-1769	2-15-11	24	28	55	3.3	.026	.268	.000	.12	6.4	30	160	0
89-1793	3-14-11	5	20	79	4.1	.094	.212	.003	.11	4.3	28	4,750	0
89-1836	4-18-11	5	25	60	4.0	.010	.114	.000	.15	3.9	23	235	0
89-1881	5-15-11	30	25	65	3.3	.000	.174	.000	.00	5.6	31	280	0
89-1943	6-15-11	3	35	80	4.4	.008	.284	.000	.00	3.6	33	25	0
89-1995	7-18-11	3	30	71	4.4	.022	.192	.000	.00	4.2	31	..	0

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MIDDLETOWN CITY SUPPLY.—LAUREL BROOK RESERVOIR.—(Continued.)

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
89-2053	8-16-11	25	35	82	4.4	.010	.234	.000	.00	5.6	34	190	0
89-2119	9-21-11	10	25	83	4.4	.072	.276	.000	.00	5.6	33	315	0
89-2172	10-16-11	20	20	73	3.8	.064	.280	.000	.00	5.3	32	195	0
89-2220	11-21-11	30	25	70	4.0	.260	.256	.000	.00	5.0	29	2,950	0
89-2253	12-19-11	10	25	70	4.0	.144	.166	.000	.25	3.7	29	790	+
89-2286	1-18-12	3	25	81	5.4	.144	.138	.001	.20	5.2	32	190	0
89-2320	2-20-12	3	20	65	6.2	.098	.164	.000	.00	4.2	33	170	0
89-2354	3-18-12	100	25	72	4.2	.110	.182	.001	.20	4.9	27	..	0
89-2374	4-16-12	15	20	50	4.0	.006	.090	.000	.00	4.0	23	125	0
89-2414	5-20-12	18	22	68	4.2	.040	.138	.000	.00	4.6	25	105	+
89-2457	6-17-12	13	18	46	4.6	.054	.130	.000	.00	3.3	23	425	0
89-2474	7- 5-12	35	28	56	4.2	.066	.200	.000	.00	3.9	31	1,800	0
89-2535	8-14-12	5	27	66	5.2	.018	.190	.000	.00	3.5	32	41	0
89-2580	9-12-12	10	37	54	5.1	.084	.240	.000	.00	3.3	28	60	+
	Average	19	24	66	4.2	.069	204	.000	.04	4.5	30	600	

Samples collected by the Middletown Water Department.

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NAUGATUCK SUPPLY.

High Pressure Service.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	Ammonia		Nitrogen as		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
95-2284	1-17-12	1	15	34	3.2	.014	.024	.000	.20	3.9	13	75	0
95-2316	2-13-12	1	20	38	3.1	.018	.020	.000	.05	2.5	18	18	0
95-2339	3- 6-12	3	10	43	2.6	.020	.082	.000	.00	4.0	17	605	+
95-2423	5-23-12	0	22	45	3.0	.004	.064	.000	.00	3.4	12	675	+
95-2489	7-16-12	0	25	35	2.8	.012	.240	.001	.00	3.1	16	630	0
95-2516	8- 7-12	10	28	41	2.8	.018	.360	.000	.00	4.4	16	3,220	0
	Average	2	20	39	2.9	.014	.132	.000	.04	3.5	15	870	

Low Pressure Service.

95-2285	1-17-12	2	12	55	2.4	.006	.022	.000	.12	3.8	16	80	0
95-2317	2-13-12	1	12	45	2.7	.002	.018	.000	.00	2.0	18	85	0
95-2340	3- 6-12	1	20	37	2.8	.004	.008	.000	.10	1.9	18	1,330	0
95-2424	5-23-12	1	24	58	2.1	.008	.072	.000	.00	3.6	16	225	+
95-2451	6-12-12	3	15	48	2.4	.000	.084	.000	.00	3.1	19	35	+
95-2515	8- 7-12	8	40	45	2.2	.012	.330	.003	.00	2.9	18	2,150	0
	Average	3	20	48	2.4	.005	.089	.000	.04	2.9	17	650	

Samples collected by the Naugatuck Water Company.

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NEW CANAAN SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
97-2237	12- 6-11	1	65	51	3.3	.080	.132	.000	.00	7.0	21	335	0
97-2278	1- 4-12	1	50	62	3.2	.008	.094	.000	.00	7.2	21	280	0
97-2309	2- 1-12	2	55	55	3.2	.038	.106	.000	.00	7.3	24	40	0
97-2337	3- 4-12	5	50	50	3.4	.042	.106	.000	.00	7.2	22	..	0
97-2371	4- 8-12	15	55	44	2.6	.010	.140	.000	.00	5.7	17	170	+
97-2399	5- 9-12	1	40	45	3.0	.010	096	.000	.00	6.0	19	30	0
97-2441	6- 4-12	2	55	56	2.6	.014	094	.000	.00	6.1	28	1,210	+
97-2483	7-12-12	20	60	54	1.8	.084	.160	.000	.00	6.4	29	..	0
97-2547*	8-22-12	60	96	63	2.6	.012	.460	.001	.00	9.2	29	120	0
97-2550*	8-22-12	30	96	73	2.5	.012	.550	.000	.00	8.9	29	650	0
97-2566	9- 3-12	30	60	67	2.4	.006	.310	.000	.00	5.7	32	220	0
	Average	18	54	54	2.8	.032	.137	.000	.00	6.5	23	230	

*Samples taken after a break in a main had stirred the water in the pipe system. Not included in the average.
Samples collected by the New Canaan Water Company.

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NORTH CANAAN SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
110-1613	10-25-10	6	5	149	2.6	.006	.042	.000	.05	2.9	128	265	0
110-2173	10-16-11	2	0	120	1.4	.112	.054	.000	.00	0.2	100	130	0
110-2175	10-17-11	1	0	167	3.4	.084	070	.000	.00	2.2	170	565	0
110-2341	3- 7-12	1	0	139	3.3	.024	054	.000	.00	1.4	119	32	0
110-2473	7- 2-12	2	2	112	1.0	.048	.050	.000	.00	1.2	110	525	0
110-2539	8-19-12	0	17	147	3.1	.030	.080	.000	.00	1.3	150	17	0
	Average	2	4	139	2.5	.051	058	.000	.01	1.5	129	250	

Samples collected by Dr. F. H. Lee, Health Officer.

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NORWALK CITY SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
112-1669	12- 7-10	10	26	52	4.4	.012	.060	.000	.00	4.3	38	160	0
112-1722	1-11-11	25	38	63	4.0	.012	.104	.000	.00	5.9	36	185	0
112-1775	2- 6-11	12	40	57	3.7	.008	.082	.000	.03	7.1	33	175	0
112-1813	2-23-11	15	45	51	3.2	.002	106	.000	.00	5.1	22	100	0
112-1848	4-20-11	1	35	41	4.2	.034	.090	.000	.00	5.2	20	275	0
112-1884	5-16-11	3	35	42	3.4	.006	132	.000	.00	5.6	19	420	0
112-1919	6- 7-11	3	45	56	3.6	.000	118	.000	.00	5.5	22	780	0
112-2017	7-27-11	3	45	60	5.2	.002	.136	.000	.00	5.2	25	750	0
112-2061	8-18-11	3	60	75	3.2	.002	.082	.000	.00	6.5	36	1,260	0
	Average	8	41	55	3.9	.008	.101	.000	.00.	5.6	28	345	

Samples collected by the Norwalk Water Department.

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NORWICH—TRADING COVE BROOK—UNFILTERED.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
113-1707	1- 4-11	2	40	44	3.2	.006	.054	.000	.10	7.3	18	1,170	+
113-1708	1- 4-11	15	38	48	3.3	.008	.056	.000	.15	7.4	22	920	+
113-1801	3-16-11	5	40	45	3.8	.002	.140	.000	.00	6.5	15	320	0
113-1864	5- 3-11	11	35	59	4.2	.006	.074	.000	.00	4.4	20	1,860	+
113-1892	5-18-11	1	60	68	4.1	.020	.086	.000	.00	7.1	25	2,570	+
113-1928	6-12-11	1	18	55	3.8	.002	.064	.000	.10	2.3	19	700	+
113-2212	11- 9-11	1	65	85	5.6	.040	.150	.000	.00	8.5	25	500	+
	Average	5	42	58	4.0	.012	.089	.000	.05	6.2	20	1,150	
						FILTERED.							
113-1865	5- 3-11	1	25	50	4.2	.010	.052	.000	.05	4.1	22	530	+
113-1891	5-18-11	1	30	46	4.1	.008	.074	.000	.00	5.9	15	1,925	+
113-1907	5-22-11	1	30	64	2.1	.012	.090	.000	.00	4.2	25	4,300	0
113-1929	6-12-11	1	0	96	3.8	.004	.038	.000	.10	0.0	30	255	+
113-2013	7-25-11	1	0	60	4.2	.010	.024	.000	.20	0.4	21	25,100*	0
113-2213	11- 9-11	1	10	147	5.2	.036	.114	.000	.00	3.0	69	10	0
	Average	1	16	77	3.9	.013	.065	.000	.06	2.9	30	1,400	

*Error in sampling. Not included in the average.
Samples collected by Norwich Water Department.

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PUTNAM SUPPLY—UNFILTERED WATER.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
126-1586	10-10-10	18	20	63	2.6	.014	.126	.000	.00	3.7	35	375	0
126-1620	11- 2-10	10	18	52	3.0	.018	.088	.000	.04	3.3	35	130	0
126-1697	12-20-10	12	14	58	3.2	.006	.096	.000	.05	3.8	31	165	0
126-1713	1- 9-11	20	32	62	3.4	.014	.108	.000	.05	6.2	33	615	0
126-1781	2-22-11	8	20	48	3.4	.008	.040	.000	.02	6.0	23	275	0
126-1796	3-14-11	1	35	57	3.4	.018	.102	.000	.09	5.7	23	500	0
126-1882	5-15-11	2	40	48	3.3	.008	.160	.000	.00	6.9	21	925	0
126-1930	6-13-11	2	35	60	3.4	.012	.090	.000	.00	3.9	21	1,700	+
126-2047	8-15-11	3	35	55	3.4	.006	.110	.000	.00	4.8	30	725	+
	Average	8	28	55	3.2	.012	.102	.000	.03	4.9	28	600	

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PUTNAM SUPPLY—FILTERED WATER.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
126-1587	10-10-10	6	5	53	2.6	.006	.056	.000	.03	2.8	37	27	0
126-1621	11- 2-10	3	7	44	2.2	.004	.044	.000	.10	2.2	35	17	0
126-1698	12-20-10	4	4	53	3.3	.004	.034	.000	.15	2.7	34	24	0
126-1714	1- 9-11	8	20	58	3.4	.004	.088	.000	.09	5.5	38	65	0
126-1782	2-22-11	1	11	54	3.2	.008	.038	.000	.05	4.5	24	35	0
126-1797	3-14-11	1	35	84	3.4	.008	.234	.000	.08	4.5	26	35	0
126-1830	4-13-11	1	35	50	3.2	.010	.078	.000	.10	5.3	20	27	0
126-1883	5-15-11	1	35	53	3.1	.002	.082	.000	.03	4.7	22	22	0
126-1931	6-13-11	1	18	50	3.4	.002	.058	.000	.04	2.6	20	40	0
126-2046	8-14-11	3	30	61	2.4	.008	.074	.000	.00	3.6	27	1,200	+
	Average	3	20	56	3.0	.006	.078	.000	.07	3.8	28	150	

Samples collected by the Putnam Water Company.

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SOUTHINGTON SUPPLY—OLD STORAGE RESERVOIR, NO. 1.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
143-2158	10-11-11	2	45	33	2.6	.044	.130	.000	.00	5.3	13	55	0
143-2229	11-22-11	2	35	49	2.6	.040	.122	.000	.00	5.2	13	380	0
143-2255	12-18-11	1	30	42	2.7	.028	.032	.000	.00	3.9	13	190	0
143-2291	1-23-12	1	25	31	2.2	.004	.014	.000	.00	4.3	12	80	0
143-2326	2-21-12	1	20	33	2.0	.008	.022	.000	.00	2.0	13	30	0
143-2370	4- 8-12	5	25	35	1.7	.004	.026	.000	.00	2.6	11	215	0
143-2426	5-23-12	2	35	33	1.8	.006	.058	.000	.00	4.6	7	50	+
143-2462	6-20-12	1	30	28	1.4	.000	.030	.000	.00	4.7	10	15	0
143-2405	7-24-12	5	35	26	3.0	.012	.320	.000	.00	4.4	12	60	+
143-2548	8-23-12	4	28	33	2.3	.018	.220	.000	.00	3.4	16	34	+
143-2573	9- 5-12	12	38	52	2.2	.030	.180	.000	.00	4.4	17	23	0
	Average	3	31	35	2.2	.017	.104	.000	.00	4.1	12	100	

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SOUTHINGTON SUPPLY—NEW STORAGE RESERVOIR, No. 2.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
143-1950	6-26-11	..	35	49	3.2	.010	.118	.000	.00	3.8	14	..	+
143-2157	10-11-11	60	45	59	3.0	.020	.294	.000	.00	9.0	16	75	+
143-2228	11-22-11	..	40	26	4.0	.100	.148	.000	.00	4.8	14	3,375	+
143-2254	12-18-11	5	30	48	2.9	.054	.070	.000	.20	3.2	16	240	+
143-2290	1-23-12	1	25	46	3.4	.032	.072	.000	.10	4.2	16	100	+
143-2327	2-21-12	2	20	38	3.6	.068	.066	.000	.23	4.5	16	60	0
143-2369	4- 8-12	10	20	33	2.7	.002	.068	.000	.00	2.7	13	250	0
143-2427	5-23-12	2	10	50	3.0	.006	.074	.001	.10	2.6	12	315	+
143-2463	6-20-12	41	12	41	2.8	.000	.060	.001	.00	3.1	18	115	0
143-2506	7-24-12	5	33	42	2.1	.012	.310	.000	.00	4.4	17	25	0
143-2549	8-22-12	3	28	40	3.1	.006	.370	.000	.00	4.1	21	140	+
143-2574	9- 5-12	10	28	42	3.0	.012	.180	.000	.00	3.2	25	200	0
	Average	14	29	46	3.3	.029	.166	.000	.05	4.5	16	445	

Samples collected by the Southington Water Department.

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SOUTH NORWALK WATER SUPPLY—FILTERED WATER.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
144-1612	10-26-10	6	10	44	3.0	.008	.094	.000	.10	2.4	31	105	0
144-1635	11-16-10	6	6	42	3.3	.006	.066	.000	.15	2.4	21	55	0
144-1682	12-14-10	4	6	46	3.2	.004	.014	.000	.15	4.4	38	65	0
144-1711	1- 5-11	4	4	48	3.6	.004	.014	.000	.15	3.9	29	65	0
144-1776	2-20-11	3	14	62	4.3	.008	.080	.000	.18	3.7	36	23	0
144-1803	3-20-11	3	35	73	4.0	.002	.088	.000	.32	4.2	28	32	0
144-1826	4-12-11	15	35	68	3.6	.028	.146	.000	.05	3.6	21	185	0
144-1827	4 12-11	1	15	50	3.6	.002	.070	.000	.10	3.4	24	470	0
144-2049	8-15-11	3	40	55	3.8	.008	096	.005	.30	2.8	29	75	0
144-2202	10-30-11	1	10	60	3.6	.002	.124	.000	.30	3.6	24	8	0
	Average	5	17	55	3.6	.007	.079	.000	.18	3.4	28	110	

Samples collected by the South Norwalk Water Department.

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WATERBURY SUPPLY—WIGWAM RESERVOIR.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
155-1647	11-21-10	32	45	51	2.6	.074	.208	.000	.10	4.8	29	115	0
155-1790	3- 7-11	1	35	84	2.7	.046	.154	.000	.10	5.5	23	2,100	+
155-1841	4-19-11	3	30	46	2.6	.078	.110	.000	.08	3.8	16	740	0
155-1952	6-26-11	10	30	47	2.2	.030	.078	.000	.08	2.8	19	6,000	0
155-2037	8- 8-11	3	15	55	2.0	.018	.064	.000	.00	3.2	25	280	0
155-2101	9-12-11	15	35	65	1.8	.008	.058	.000	.00	5.2	26	325	+
	Average	11	32	58	2.3	.042	.112	.000	.06	4.2	23	1,590	

Samples collected by the Waterbury Water Department.

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WESTPORT VILLAGE SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
173-1598	10-18-10	3	1	64	9.2	.004	.006	.000	.10	0.10	35	8	0
173-1630	11-14-10	4	1	94	27.0	.002	.006	.000	.03	0.20	38	72	0
173-1680	12-13-10	3	1	54	11.6	.006	.008	.000	.00	0.18	33	17	0
173-1735	1-18-11	6	1	53	7.4	.006	.012	.000	.10	0.05	36	16	0
173-1785	3- 2-11	Chemical sample lost, bottle broken.										137	0
173-1958	6-26-11	1	0	69	4.2	.000	.006	.000	.00	0.30	27	3,000	0
173-2067	8-15-11	1	0	65	6.0	.004	.002	.000	.10	0.00	32	2,200	0
	Average	3	1	66	10.9	.004	.007	.000	.05	0.14	33	780	

Samples collected by the Westport Water Company.

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WILLIMANTIC CITY SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
175-1589	10-11-10	10	24	44	2.4	.020	.096	.000	.00	3.2	28	140	0
175-1626	11- 8-10	10	52	50	4.0	.010	.106	.000	.10	8.7	25	90	+
175-1690	12-19-10	8	25	56	4.4	.006	.042	.000	.10	3.5	30	75	0
175-1712	1- 9-11	8	45	56	4.2	.006	.062	.000	.10	8.0	25	345	0
175-1755	2- 7-11	10	40	40	2.4	.008	.050	.000	.08	6.2	19	495	+
175-1806	3-22-11	1	40	68	3.4	.004	.078	.000	.00	5.9	16	135	+
175-1855	4-27-11	1	40	35	3.0	.002	.044	.000	.00	5.4	13	165	0
175-1877	5-10-11	1	40	38	2.8	.016	.088	.000	.00	5.2	15	220	0
175-1917	6- 5-11	1	50	53	2.7	.014	.088	.000	.00	5.0	17	320	0
175-1996	7-12-11	2	40	63	3.0	.000	.080	.000	.00	3.3	19	..	+
175-2035	8- 8-11	1	35	58	2.7	.016	.096	.000	.00	3.5	28	3,050	+
175-2102	9-13-11	1	40	88	2.4	.012	.080	.000	.00	7.0	26	140	+
175-2271	12-28-11	1	40	57	2.4	.002	.046	.000	.00	5.3	17	225	+
175-2279	1-11-12	1	30	36	2.8	.036	.058	.000	.00	5.5	19	1,080	+
175-2333	2-28-12	1	40	37	2.2	.036	.126	.000	.00	6.8	15	4.320	+

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WILLIMANTIC CITY SUPPLY.—(Continued.)

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
175-2356	3-20-12	1	35	39	2.0	.004	.096	.000	.00	4.4	17	1,000	+
175-2366	4- 3-12	1	30	35	1.8	.028	.082	.000	.00	4.6	14	180	+
175-2412	5-16-12	2	45	41	1.8	.010	.092	.000	.00	6.7	16	..	+
175-2442	6- 6-12	15	70	38	2.2	.018	.204	.000	.00	7.8	19	165	+
175-2482	7-11-12	0	35	44	2.8	.012	.190	.000	.00	4.6	20	170	+
175-2536	8-14-12	1	35	54	2.8	.036	.130	.000	.00	3.7	23	530	+
175-2567	9- 4-12	0	49	66	2.8	.030	.140	.000	.00	6.5	29	110	+
	Average	3	40	50	2.8	.015	.140	.000	.02	5.5	20	650	

Samples collected by the Willimantic Water Department.

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WINSTED BOROUGH SUPPLY.

Laboratory No.	Date	Turbidity	Color	Total Solids	Chlorine	AMMONIA		NITROGEN AS		Oxygen Consumed	Total Hardness as $CaCo_3$	Bacteria per c. c.	Colon Bacilli
						Free	Albuminoid	Nitrites	Nitrates				
183-1637	11-17-10	8	27	39	1.6	.012	.072	.000	.10	5.2	22	100	0
183-1699	12-22-10	3	30	42	1.7	.010	.112	.000	.10	5.1	22	90	0
183-1783	2-23-11	2	27	37	1.6	.008	.056	.000	.01	6.3	20	120	0
183-1922	6- 7-11	1	30	40	2.0	.004	.068	.000	.00	5.9	16	250	0
183-2073	8-22-11	3	40	63	2.2	.064	.104	.000	.00	4.8	18	330	0
183-2430	5-27-12	0	20	53	1.8	.004	.052	.000	.00	2.9	23	70	0
	Average	3	29	46	1.8	.017	.077	.000	.03	5.0	20	160	

Samples collected by the Winsted Water Department.

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DEPARTMENT OF PUBLIC HEALTH

STATE OF CONNECTICUT

STATE BOARD OF HEALTH.

	Term Expires.
THEODORE H. MCKENZIE, Civil Engineer, Southington	July 1, 1913
ARTHUR J. WOLFF, M. D., Hartford	July 1, 1913
ALBERT W. PHILLIPS, M. D., Derby	July 1, 1915
LOUIS J. PONS, M. D., Roxbury	July 1, 1915
EDWARD K. ROOT, M. D., Hartford, President	July 1, 1917
LEWIS SPERRY, Attorney-at-law, South Windsor	July 1, 1917

JOSEPH H. TOWNSEND, M. D., Secretary and member, (*ex-officio.*)

Appointed by the Board.

Executive Office, Rooms 13-15, Capitol, Hartford.

COUNTY AND TOWN OFFICIALS AND HEALTH OFFICIALS OF THE CITIES AND BOROUGHS OF CONNECTICUT.

(Arranged in Alphabetical order by Counties.)

Place.	Name.	P. O. Address.
HARTFORD COUNTY	Daniel A. Markham	Hartford.
NEW HAVEN COUNTY	Carleton E. Hoadley	New Haven.
NEW LONDON COUNTY	Arthur M. Brown	Norwich.
FAIRFIELD COUNTY	George E. Hill	Bridgeport.
WINDHAM COUNTY	George E. Hinman	Willimantic.
LITCHFIELD COUNTY	Frank W. Etheridge	Thomaston.
MIDDLESEX COUNTY	Wesley U. Pearne	Middletown.
TOLLAND COUNTY	Edward M. Yeomans	Andover.

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HARTFORD COUNTY.

DANIEL A. MARKHAM, Esq., County Health Officer, Hartford.

Place.	Name.	P. O. Address.
AVON	V. H. C. Morse, M. D.	Avon.
BERLIN	G. P. Dunham, M. D.	Berlin.
BLOOMFIELD	G. F. Woodford	Bloomfield.
BRISTOL	H. D. Brennan, M. D.	Bristol.
BURLINGTON	John D. Luby	Bristol, R. F. D. No. 3.
CANTON	G. F. Lewis, M. D.	Collinsville.
EAST GRANBY	Frank H. Dibble	East Granby.
EAST HARTFORD	F. H. Mayberry, M. D.	East Hartford.
EAST WINDSOR	H. O. Allen, M. D.	Broad Brook.
ENFIELD	G. T. Finch, M. D.	Thompsonville.
FARMINGTON	Richard Blackmore, M.D.	Farmington.
GLASTONBURY	C. G. Rankin, M. D.	Glastonbury.
GRANBY	Wesley N. Clark	Granby.
HARTLAND	Edward A. Gaylord	Hartland,
MANCHESTER	W. R. Tinker, M. D.	South Manchester.
MARLBOROUGH	Wm. W. Bolles	Marlborough.
NEW BRITAIN	H. T. Bray, M. D.	New Britain.
NEWINGTON	John S Kirkham	Newington.
PLAINVILLE	J N. Bull, M. D.	Plainville.
ROCKY HILL	F. L. Burr, M. D.	Rocky Hill.
SIMSBURY	W. R. Munson, M. D.	Tariffville.
SOUTHINGTON	W. G. Steadman, M. D.	Southington.
SOUTH WINDSOR	H. A. Deane, M. D.	R. F. D., Burnside.
SUFFIELD	W. E. Caldwell, M. D.	Suffield.
WEST HARTFORD	F. H. Stadtmueller	Elmwood.
WETHERSFIELD	E. G. Fox, M. D.	Wethersfield.
WINDSOR	H. F. King, M. D.	Windsor.
WINDSOR LOCKS	J. A. Coogan, M. D.	Windsor Locks.

CITY HEALTH OFFICERS.

HARTFORD	*President*	T. F. Kane, M. D.
	Health Officer	C. P. Botsford, M. D.
NEW BRITAIN	*Health Officer*	H. T. Bray, M. D.

BOROUGH HEALTH OFFICERS.

BRISTOL	H. D. Brennan, M. D.
SOUTHINGTON	W. G. Steadman, M. D.

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NEW HAVEN COUNTY.

CARLETON E. HOADLEY, Esq., County Health Officer, New Haven.

Place.	Name.	P. O. Address.
NEW HAVEN	F. W. Wright, M. D.	New Haven.
BEACON FALLS	Chas. D. Roberts	Beacon Falls.
BETHANY	S. G Davidson	Bethany.
BRANFORD	C. W. Gaylord, M. D.	Branford.
CHESHIRE	C. N. Denison, M. D.	Cheshire.
EAST HAVEN	E. C. M. Hall, M. D.	New Haven.
GUILFORD	R. B. West, M. D.	Guilford.
HAMDEN	W. S. Lay, M. D.	Hamden.
MADISON	M P. Rindge, M. D.	Madison.
MERIDEN	E. A. Wilson, M. D.	Meriden.
MIDDLEBURY	G. B. Bristol, M. D.	Middlebury.
MILFORD	W. S. Putney, M. D.	Milford.
NAUGATUCK	W. A. Reilly, M. D.	Naugatuck.
NORTH BRANFORD	I. E. Brainard, M. D.	Wallingford.
NORTH HAVEN	R. B. Goodyear, M. D.	North Haven.
ORANGE	C. A. Bevan, M. D.	West Haven.
OXFORD	G. W. Cable	Oxford.
PROSPECT	S. A. Talmadge	Prospect.
SEYMOUR	F. G. Bassett	Seymour.
SOUTHBURY	Wm. H. Wakelee	Southbury, R. F. D. No. 1
WALLINGFORD	W. P. Wilson, M. D.	Wallingford.
WOLCOTT	J. H. Garrigus	Waterbury, R. F. D. No. 1
WOODBRIDGE	LeRoy C. Beecher	Westville, R. F. D. No. 1.

CITY HEALTH OFFICERS.

ANSONIA	F. C. Goldstein, M. D.
DERBY	E. O'R. McGuire, M. D.
MERIDEN	L. F. Wheatley, M. D.
NEW HAVEN	F. W. Wright, M. D.
WATERBURY	T. J. Kilmartin, M. D.

BOROUGH HEALTH OFFICERS.

BRANFORD	C. W. Gaylord, M. D.
GUILFORD	R. B. West, M. D.
WALLINGFORD	Wm. P. Wilson, M. D.

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NEW LONDON COUNTY.

ARTHUR M. BROWN, Esq., County Health Officer, Norwich.

Place.	Name.	P. O. Address.
BOZRAH	N. Johnson, M. D.	Fitchville.
COLCHESTER	J. M. Klein, M. D.	Colchester.
EAST LYME	F. H. Dart, M. D.	Niantic.
FRANKLIN	J. Henry King	Yantic, R. F. D. No. 2.
GRISWOLD	G. H. Jennings, M. D.	Jewett City.
GROTON	A. M. Purdy, M. D.	Mystic.
LEBANON	E. L. Danielson, M. D.	Lebanon.
LEDYARD	J. A. Stoddard	Gales Ferry, R.F.D. No. 1
LISBON	Chas. D. Wolf	Jewett City.
LYME	J. G. Ely, M. D.	Hamburgh.
MONTVILLE	M. E. Fox, M. D.	Uncasville.
NORTH STONINGTON	R. E. Harrington, M. D.	North Stonington.
NORWICH	Geo. Thompson, M. D.	Taftville.
OLD LYME	E. K. Devitt, M. D.	Lyme.
PRESTON	A. D. Zabriske	Norwich, R. F. D. No. 3.
SALEM	J. M. Klein, M. D.	Colchester.
SPRAGUE	L. J. Fontaine	Baltic.
STONINGTON	C. F. Congdon, M. D.	Mystic.
VOLUNTOWN	O. S. Rix	Voluntown.
WATERFORD	G. M. Minor, M. D.	Waterford.

CITY HEALTH OFFICERS.

NEW LONDON	J. T. Black, M. D.
NORWICH	N. B. Lewis, M. D.

BOROUGH HEALTH OFFICERS.

COLCHESTER	J. M. Klein, M. D.
GROTON	F. W. Hewes, M. D.
JEWETT CITY	G. H. Jennings, M. D.
STONINGTON	C. F. Congdon, M. D.

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FAIRFIELD COUNTY.

GEORGE E. HILL, Esq., County Health Officer, Bridgeport.

Place.	Name.	P. O. Address.
DANBURY	G. E. Lemmer, M. D.	Danbury.
BETHEL	A. E. Barber, M. D.	Bethel.
BROOKFIELD	F. S. Curtis	Brookfield Center.
DARIEN	G. H. Noxon, M. D.	Darien.
EASTON	G. B. Beers	Bridgeport, R.F.D. No. 1
FAIRFIELD	W. H. Donaldson, M. D.	Fairfield.
GREENWICH	A. W. Klein, M. D.	Greenwich.
HUNTINGTON	W. S. Randall, M. D.	Derby.
MONROE	S. B. Hayes	Stepney.
NEW CANAAN	E. J. O'Saughnessy, M. D.	New Canaan.
NEW FAIRFIELD	W. S. Watson, M. D.	Danbury.
NEWTOWN	W. H. Kiernan, M. D.	Sandy Hook.
NORWALK	W. J. Tracey, M. D.	Norwalk.
REDDING	H. P. Mansfield, M. D.	Ridgefield.
RIDGEFIELD	R. W. Lowe, M. D.	Ridgefield.
SHERMAN	N. T. Hungerford	Gaylordsville, R.F.D. 1.
STAMFORD	R. W. Crane, M. D.	Stamford.
STRATFORD	G. F. Lewis, M. D.	Stratford.
TRUMBULL	E. S. Fairchild	Nichols.
WESTON	F. Gorham, M. D.	Lyon's Plain.
WESTPORT	F. Powers, M. D.	Westport.
WILTON	Thos. F. Scanlon, M. D.	Georgetown.

CITY HEALTH OFFICERS.

BRIDGEPORT	E. A. McLellan, M. D.
DANBURY	G. E. Lemmer, M. D.
NORWALK	W. J. Tracey, M. D.
SOUTH NORWALK	H. B. West, M. D.
STAMFORD	T. J. Biggs, M. D.

BOROUGH HEALTH OFFICERS.

BETHEL	A. E. Barber, M. D.
GREENWICH	A. W. Klein, M. D.
NEW CANAAN	E. J. O'Shaughnessy, M. D.
RIDGEFIELD	R. W. Lowe, M. D.
SHELTON	G. A. Shelton, M. D.

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WINDHAM COUNTY.

GEORGE E. HINMAN, Esq., County Health Officer, Willimantic.

Place.	Name.	P. O. Address.
BROOKLYN	E. C. Babson	Danielson.
ASHFORD	Geo. O. Balch	Warrenville.
CANTERBURY	J. O. Smith, M. D.	So. Canterbury, R.F.D. 1
CHAPLIN	F. C. Lummis	Chaplin.
EASTFORD	H. H. Converse, M. D.	Eastford.
HAMPTON	J. H. Fitts	Hampton.
KILLINGLY	W. H. JUDSON M. D.	Danielson.
PLAINFIELD	A. A. Chase, M. D.	Plainfield.
POMFRET	C. O. Thompson	Pomfret Center.
PUTNAM	Omer LaRue, M. D.	Putnam.
SCOTLAND	A. H. Gallup	Scotland.
STERLING	O. W. Bates	Oneco.
THOMPSON	G. W. H. Williams, M.D.	No. Grosvenor Dale.
WINDHAM	F. E. Wilcox, M. D.	Willimantic.
WOODSTOCK	Joseph Spalding, M. D.	Woodstock.

CITY HEALTH OFFICERS.

WILLIMANTIC	W. P. S. Keating, M. D.

BOROUGH HEALTH OFFICERS.

DANIELSON	W. H. Judson, M. D.

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LITCHFIELD COUNTY.

FRANK W. ETHERIDGE, Esq., County Health Officer, Thomaston.

Place.	Name.	P. O. Address.
LITCHFIELD	C. I. Page, M. D.	Litchfield.
BARKHAMSTED	H. B. Case	Barkhamsted.
BETHLEHEM	E. Irving Stone	Bethlehem.
BRIDGEWATER	R. S. Day, M. D.	New Milford.
CANAAN	F. S. Skiff, M. D.	Falls Village.
COLEBROOK	H. L. Culver	Winsted, R. F. D. No. 1.
CORNWALL	Joseph Robinson, M. D.	West Cornwall.
GOSHEN	J. H. North, M. D.	Goshen.
HARWINTON	W. J. Barber	Campville.
KENT	E. W. Bull	Kent.
MORRIS	L. W. Whittlesey	Morris.
NEW HARTFORD	F. P. Marble	New Hartford.
NEW MILFORD	J. C. Barker, M. D.	New Milford.
NORFOLK	I. L. Hamant, M. D.	Norfolk.
NORTH CANAAN	F. H. Lee, M. D.	Canaan.
PLYMOUTH	R. J. Lawton, M. D.	Terryville.
ROXBURY	L. J. Pons, M. D.	Roxbury.
SALISBURY	W. B. Bissell, M. D.	Lakeville.
SHARON	C. W. Bassett, M. D.	Sharon.
THOMASTON	J. H. Kane, M. D.	Thomaston.
TORRINGTON	George Streit, M. D.	Torrington.
WARREN	Wm. Forestelle	Warren.
WASHINGTON	H. G. Stevens, M. D.	New Preston.
WATERTOWN	J. S. Martin, M. D.	Watertown.
WINCHESTER	S. G. Howd, M. D.	Winsted.
WOODBURY	H. S. Allen, M. D.	Hotchkissville.

BOROUGH HEALTH OFFICERS.

LITCHFIELD	C. I. Page, M. D.
TORRINGTON	George Streit, M. D.
WINSTED	S. C. Wheeler.

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MIDDLESEX COUNTY.

WESLEY U. PEARNE, Esq., County Health Officer, Middletown.

Place.	Name.	P. O. Address.
MIDDLETOWN	J. H. McDougall, M. D.	Middletown.
CHATHAM	G. N. Lawson, M. D.	Middle Haddam.
CHESTER	F. Summer Smith, M. D.	Chester.
CLINTON	H. S. Reynolds, M. D.	Clinton.
CROMWELL	C. E. Bush, M. D.	Cromwell.
DURHAM	E. A. Markham, M. D.	Durham
EAST HADDAM	M. W. Plumstead, M. D.	East Haddam.
ESSEX	F. B. Bradeen, M. D.	Essex.
HADDAM	LeR. A. Smith, M. D.	Higganum.
KILLINGWORTH	H. S. Reynolds, M. D.	Clinton.
MIDDLEFIELD	J. E. Bailey, M. D.	Middletown.
OLD SAYBROOK	Irwin Graniss, M. D.	Saybrook.
PORTLAND	F. E. Potter, M. D.	Portland.
SAYBROOK	H. T. French, M. D.	Deep River.
WESTBROOK	E. J. Lyman, M. D.	Westbrook.

CITY HEALTH OFFICERS.

MIDDLETOWN ..... T. P. Walsh, M. D.

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TOLLAND COUNTY.

EDWARD M. YEOMANS, Esq., County Health Officer, Andover.

Place.	Name.	P. O. Address.
TOLLAND	C. S. Hurlbut	Rockville, R. F. D. No. 4.
ANDOVER	S. L. French	Andover.
BOLTON	J. White Sumner	Bolton.
COLUMBIA	R. L. Cobb	Columbia.
COVENTRY	W. L. Higgins, M. D.	So. Coventry.
ELLINGTON	E. A. Brace, M. D.	Ellington.
HEBRON	C. H. Pendleton, M. D.	Hebron.
MANSFIELD	W. E. Cramm, M. D.	Mansfield Center.
SOMERS	A. L. Hurd, M. D.	Somers.
STAFFORD	F. L. Smith, M. D.	Stafford Springs.
UNION	A. M. Heck	Stafford Springs, R.F.D.2
VERNON	E. P. Flint, M. D.	Rockville.
WILLINGTON	F. B. Converse, M. D.	West Willington.

CITY HEALTH OFFICERS.

ROCKVILLE ..... J. E. Flaherty, M. D.

BOROUGH HEALTH OFFICERS.

STAFFORD SPRINGS ..... J. R. Parkhurst.

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EXAMINING BOARDS OF THE STATE MEDICAL SOCIETIES.

BOARD OF THE CONNECTICUT MEDICAL SOCIETY.

Name.	Address.	Term Expires.
Dr. J. F. Calef	Middletown	January 1914.
Dr. W. L. Barber	Waterbury	January 1915.
Dr. C. A. Tuttle	New Haven	January 1916.
Dr. S. M. Garlick	Bridgeport	January 1917.
Dr. J. B. McCook	Hartford	January 1918.

BOARD OF THE CONNECTICUT HOMEOPATHIC MEDICAL SOCIETY.

Name.	Address.	Term Expires.
Dr. H. A. Roberts	Derby	January 1914.
Dr. E. C. M. Hall	New Haven	January 1915.
Dr. E. H. Linnell	Norwich	January 1916.
Dr. W. P. Baldwin	New Haven	January 1917.
Dr. Frederick Wilcox	Willimantic	January 1918.

BOARD OF THE CONNECTICUT ECLECTIC MEDICAL ASSOCIATION.

Name.	Address.	Term Expires.
Dr. Leonard Bailey	Middletown	January 1914.
Dr. John W. Fyfe	Saugatuck	January 1915.
Dr. E. A. Markham	Durham	January 1916.
Dr. James E. Hair	Bridgeport	January 1917.
Dr. T. S. Hodge	Torrington	January 1918.

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ALPHABETICAL LIST

(Continued from last report.)

Of the Medical Practitioners in Connecticut who, in compliance with the Medical Practice Act, have registered in the office of the State Board of Health between October 1, 1910, and October 1, 1912.

When no post office address is given, it is understood to be the place where registered.

Name.	Where Registered.	P. O. Address.
Bailey, Neil H.	Hartford.	
Beardsley, Wm. H.	Enfield	Springfield Mass.
Biram, James H.	Hartford.	
Birdsong, Julian L.	Hartford.	
Blackmore, Richard	Farmington.	
Bonner, Robert A.	Waterbury	Baltimore, Md.
Booth, Lewis S.	New Haven.	
Brace, Edward A.	Wethersfield.	
Branth, John H.	Milford.	
Brayton, Howard W.	Hartford.	
Brown, Louis R.	Middletown.	
Cahill, George F.	Greenwich	New York, N. Y.
Callahan, John W.	Hartford.	
Callender, Eugene F.	Waterbury.	
Cangiolosi, Ignazio	New Haven.	
Cantarow, Daniel	Hartford.	
Carroll, Charles H.	New Haven.	
Churchman, John W.	New Haven.	
Clarke, Harold M.	Bridgeport.	
Cogswell, Eliot S.	Hartford.	
Costello, Henry N.	Hartford.	
Cowen, Melvin E.	Westport	Green's Farms.
Coyle, Anna E. M.	Windsor Locks.	
Crandall, Charles P.	Greenwich	Philadelphia, Pa.
Criger, Henry F.	Orange	West Haven.
Curley, William H.	Bridgeport.	
Davis, George A.	Norwich.	
Donnelly, William H.	Canton	Collinsville.
Edmonson, Henry T.	Hartford.	
English, Chester F.	Hartford.	
Erdman, Jennie G. P.	Preston	Norwich.

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Name.	Where Registered.	P. O. Address.
Erdman, Thomas F.	Preston	Norwich.
Falsey, Edward T.	New Haven.	
Farley, Edward B.	Hartford.	
Fauver, Edgar	Middletown.	
Fisher, Wm. J. H.	New Haven.	
Finklestone, Benj. B.	Bridgeport.	
Finn, Edward J.	Huntington	Shelton.
Flaherty, Claude V.	Hartford.	
Flanagan, George M.	Hartford.	
Flint, Joseph M.	New Haven.	
Flynn, Charles T.	New Haven.	
Freid, Harry	New Haven.	
Gade, Carl J.	Waterbury.	
Gillespie, Wm. B.	Salisbury	Morrisonville, N. Y.
Goldman, George	New Haven.	
Good, William M.	Waterbury.	
Gorman, James F.	Manchester	So. Manchester.
Grandmaison, Albert J.	Waterbury.	
Greenstein, Charles J.	New Britain.	
Gross, Abraham B.	Hartford.	
Hamblin, Frank M.	Bristol.	
Harmon, G. E.	Preston	Norwich.
Harnett, J. D.	Hartford.	
Harrington, Amos T.	Hartford.	
Hart, Arthur H.	Farmington.	
Harten, James A.	New Haven.	
Harvey, Edward R.	Waterbury.	
Hoffman, Harry F.	Preston	Norwich.
Holmes, La Verne	Manchester.	
Howland, Edward J.	Norwich.	
Hutchinson, John	Manchester	So. Manchester.
Hurwitz, Herman M.	Hartford.	
Hyde, Charles E.	Bridgeport.	
Irwin, Vincent J.	Granby.	
Jenkins, Charles A.	Willimantic.	
Jones, Charles E., Jr.	Hartford.	
Kaprielian, H. K.	Greenwich.	
Kempe, Howard M.	Hartford.	
Kennedy, Philip T.	Hartford.	
Kennedy, William C.	Waterbury.	
Kilbourn, Joseph B.	Hartford.	
Kinzey, John A.	New Haven.	
Klingon, Louis E.	Colchester.	
Lambert, Henry B.	Bridgeport.	
LaPierre, Arnaud J.	Norwich.	
Leach, Charles D.	Hartford.	

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Name.	Where Registered.	P. O. Address.
Lear, Maxwell	New Haven.	
Levy, Louis H.	Greenwich.	
Lock, John A.	Stamford.	
Lyon, Waterman	New Britain.	
Madden, Leon I.	Hartford.	
Magill, Aubrey L.	Greenwich	Trenton, N. J.
Maine, Thurman P.	Stonington	No. Stonington.
McDermott, M. J.	Waterbury.	
McDonald, John J.	Greenwich	Jersey City, N. J.
McKendree, Chas. H.	Cromwell.	
McLaury, Frank H.	Westport.	
Milburn, John D.	New Haven.	
Morrison, Fred J.	New London.	
Murray, Thomas J.	New London.	
Noble, Charles G.	Greenwich	Brooklyn, N. Y.
Nugent, William H.	New Haven.	
Oelschlegel, H. C.	Greenwich	Brooklyn, N. Y.
O'Neil, William H.	Waterbury.	
Orcutt, Wallace L.	New Haven.	
Pendleton, Wilson	Wallingford.	
Peters, H. LeBaron	Bridgeport.	
Peterson, Clark K.	Canaan	Great Barrington, Mass.
Piasecki, Joseph L.	Hartford.	
Prince, Alex L.	New Haven.	
Reich, Upton S.	Bridgeport.	
Reynolds, Harry St. C.	New Haven.	
Rice, Richard W.	Wethersfield	So. Manchester.
Rinde, Hamilton	Middletown.	
Robinson, Edward T.	Bridgeport.	
Roche, Thomas J.	Bridgeport.	
Ross, Donald L.	Mansfield.	Mansfield Depot.
Russell, Thos. H., Jr.,	New Haven.	
Scofield, Everett J.	Danbury.	
Scrimgeour, Arthur	Bridgeport.	
Shea, John F.	Bridgeport.	
Sheehan, Mark T.	Wallingford.	
Simonton, Frank F.	Enfield	Thompsonville, Conn.
Smail, Martin L.	Stonington	Mystic.
Smernoff, Abraham A.	Greenwich	New York, N. Y.
Smith, David P.	Meriden.	
Smith, Frederick D.	New Haven.	
Smith, Sidney E.	Sherman	Gaylordsville, R.F.D., 1
Smykowski, Bronislaw,	Bridgeport.	
Soffier, Jacob	New Haven.	
Soltz, Thomas	New London	
States, Eugene J.	New Haven.	

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Name.	Where Registered.	P. O. Address.
Strobel, Joseph E.	Hartford.	
Sullivan, Daniel E.	Norwich.	
Thielche, George E.	Waterbury.	
Thoms, Herbert K.	New London.	
Truex, Edward H.	Hartford	East Hartford
Turrill, Henry S.	Canaan.	
Tyler, George T.	Stamford.	
Vail, Thornton E.	Enfield	Thompsonville.
Van Doren, Wm. H.	Stamford	
Volkenheim, Mendel	New Britain	
Wagner, Harver	Enfield	Westfield, Mass.
Walker, Lester E.	Norwich.	
Westervelt, Marvin Z.	Litchfield.	
Whelock, Albert A.	Darien	Noroton.
White, Herman R.	Hartford	
Whiting, Leonard C.	Hamden	Whitneyville.
Williams, Harry St. J.	Bridgeport	
Wilson, Frank E.	Norwich	
Wilson, Leslie A.	Meriden	
Wilson, McLeod C.	West Hartford	
Wright, Frank M.	Stamford	

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LIST OF MIDWIVES WHO HAVE BEEN LICENSED AND REGISTERED IN THE OFFICE OF THE STATE BOARD OF HEALTH BETWEEN OCTOBER 1, 1910, AND OCTOBER 1, 1912.

When no Postoffice address is given, it is understood to be the place registered.

Name.	Where Registered.	P. O. Address.
Ankers, Lucy	Derby.	
Antalne, Trojzian	Norwalk	So. Norwalk.
Avmoriewicz, Amiela	Greenwich.	
De Paolis, Antonetta	New Haven.	
Domon, Maryanna	Hartford.	
Dworak, Susan	Bridgeport.	
Dziedzic, Karolina L.	Meriden.	
Gallo, Maryanna	Bridgeport.	
Guarniere, Rosina	New Haven.	
Gunosdowska, Josepa	Meriden.	
Koch, Maria	New Haven.	
Maria, Peto Szabo	Bridgeport.	
Mayercik, Katarina	Danbury.	
Munkacsy, Rosa	Bridgeport.	
Norko, Panna	New Haven.	
Onuska, Juliana	Greenwich.	
Otvos, Terez	Bridgeport.	
Pauski, Malvina E.	Meriden.	
Perilly, Mary	Waterbury.	
Petro, Elizabeth	Bridgeport.	
Pietrzyk, Antonina M.	New Haven.	
Przedpelska, Julia	Meriden.	
Salamon, Susannah	Bridgeport.	
Sampagnaro, Lucia	Hartford.	
Sirot, Jennie	New Britain.	
Stawenska, Julia	New Haven.	
Stemmler, Anna	New Haven.	
Stokes, Selma	Naugatuck.	
Streliczki, Veron T.	Bridgeport.	
Szues, Julia	Waterbury.	
Szymboiska, Learkadia	Stamford.	
Taber, Rose	Waterbury.	
Tofil, Teresa	Hartford.	
Trudler, Hara F.	New Haven.	
Vorasse, Francesca	Ansonia.	

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TREASURER'S REPORT

(Verified by vouchers on file in Comptroller's office.)

The Treasurer herewith submits the following statement of money received from the Comptroller on account of the State Board of Health.

From October 1, 1910, to October 1, 1911.

RECEIPTS.

1910.		
Oct. 1.	By balance from last account	$197 09
Oct. 31.	By cash from Comptroller	1,250 00
1911.		
Jan. 31.	By cash from Comptroller	1,250 00
May 3.	By cash from Comptroller	1,250 00
Aug. 1.	By cash from Comptroller	3,000 00
	Salary of Secretary	3,000 00
		$8,197 09

DISBURSEMENTS.

For traveling and other necessary expenses of members of Board when on duty	$319 25
Books and subscriptions to sanitary literature	60 90
Printing and stationery	1,854 85
Library Bureau, copy and index cards	245 74
Clerical expenses in Secretary's office	1,553 75
Postage	156 00
Express and cartage	39 98
Miscellaneous items	34 87
Sanitary inspections, Mr. Ham	252 54
Water investigations, Mr. Newlands (special)	112 27
Telephone, long distance tolls	33 20
Legislative bills	21 75
Expert services	25 00
Conference State Boards of Health	10 00
Addressograph	168 50
Salary of Secretary	3,000 00
	$7,888 60
To balance paid into Treasury	308 49
	$8,197 09

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From October 1, 1911, to October 1, 1912.

RECEIPTS.

1911.		
Oct. 30.	By cash from Comptroller	$1,250 00
1912.		
Jan. 29.	By cash from Comptroller	1,250 00
Apr. 29.	By cash from Comptroller	1,250 00
July 31.	By cash from Comptroller	1,250 00
	Salary of Secretary	3,000 00
		$8,000 00

DISBURSEMENTS.

For traveling and other necessary expenses of members of the Board when on duty	$770 77
Books and subscriptions to sanitary literature	22 00
Printing and stationery	1,634 33
Library Bureau, copy and index cards	172 61
Clerical expenses in Secretary's office	1,925 00
Postage	96 00
Express and cartage	37 00
Typewriting and miscellaneous items	22 76
Sanitary inspections, Mr. Ham	99 40
Water investigations, Mr. Newlands (special)	29 30
Telephone, long distance tolls	27 60
Derby Desk Co., copy cards	9 20
Advertising, drinking cup regulations	15 65
Addressograph plates	20 74
Expert services	25 00
Stenographer at Health conference, Mr. Roberts	35 40
Salary of Secretary	3,000 00
	$7,942 76
To balance	57 24
	$8,000 00

Attest:

JOSEPH H. TOWNSEND, M. D., *Treasurer.*

STATE BOARD OF HEALTH, IN ACCOUNT WITH APPROPRIATION FOR CHEMICAL AND BACTERIOLOGICAL WORK.

FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1911.

RECEIPTS.

1910.		
Oct. 1.	Cash on hand	$ 9 08
Oct. 31.	Cash from Comptroller	1,875 00
1911.		
Jan. 31.	Cash from Comptroller	1,875 00
Feb. 20.	Cash from Comptroller	625 00
May 3.	Cash from Comptroller	1,250 00
Aug. 1.	Cash from Comptroller	1,875 00
		$7,509 08

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DISBURSEMENTS.

Salaries	$5,433 33
Postage	285 92
Express	168 87
Labor	302 50
Traveling expenses	85 75
Gas and electricity	104 42
Telephone	92 25
Printing	216 25
New equipment, chemicals, mailing outfits, etc.	819 79
	$7,509 08

FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1912.

RECEIPTS.

1911.		
Oct. 30.	Cash from Comptroller	$2,000 00
1912.		
Jan. 29.	Cash from Comptroller	2,000 00
Apr. 29.	Cash from Comptroller	2,000 00
July 31.	Cash from Comptroller	2,000 00
		$8,000 00

DISBURSEMENTS.

Salaries	$5,433 33
Labor	426 00
Postage	288 25
Printing	189 60
Telephone	88 40
Express	124 70
Traveling expenses	174 89
Gas and electricity	71 88
New equipment, chemicals, mailing outfits, etc.	910 56
	$7,707 61
Cash to balance	292 39
	$8,000 00

APPROPRIATION FOR THE FREE DISTRIBUTION OF ANTITOXINS.

During the fiscal year ending September 30, 1912, there was paid to The H. K. Mulford Co., Philadelphia, for antitoxins, the sum of $4,664.16.

Attest:

JOSEPH H. TOWNSEND, M. D.,
Treasurer.

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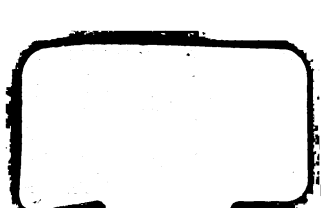
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